



# NOAA Technical Memorandum NMFS-NOAA-96

## Cumulative Monthly Weight and Ex-Vessel Value, and Monthly Price per Pound, for Brown Shrimp Catches from the Northern Gulf of Mexico, 1960-1981

By

Charles Wax Caillouet, Jr.

and

Dennis Brian Koi

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U. S. DEPARTMENT OF COMMERCE  
Malcolm Baldrige, Secretary

National Oceanic and Atmospheric Administration  
Dr. John V. Byrne, Administrator

National Marine Fisheries Service  
William G. Gordon, Assistant Administrator for Fisheries

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## INTRODUCTION

The reported monthly catches of brown shrimp, Penaeus aztecus Ives, reflect recurring life cycle events and seasonal removals by inshore (landward of barrier islands) and offshore (seaward of barrier islands) fisheries (see Christmas and Etzold, 1977; and Gulf of Mexico Fishery Management Council, 1980). The seasonal timing of peaks and troughs in the catches may vary from year to year, depending upon climatic influences, recruitment, survival, and growth of shrimp, and market conditions, as well as changes in the timing and duration of open fishing seasons set by shrimp management agencies. Differences in such time-phasing of fishing activities exist among the states of Texas, Louisiana, Mississippi and Alabama, as related to differences in regulations governing the time and area of fishing within territorial waters (GMFMC, 1980). Beginning in 1981, federal regulations promulgated as an outgrowth of the fishery management plan for the shrimp fishery of the Gulf of Mexico also affected the time-phasing of fishing for brown shrimp off the coast of Texas (GMFMC, 1980). From May 15 to August 22, 1981, the Fishery Conservation Zone (from the edge of the territorial sea out to 200 miles from the coastal baseline) off Texas was closed to shrimping for brown shrimp. This management measure was dubbed the "Texas Closure".

Time-phasing of fishing activities influences the size distribution of the catches, and ex-vessel value is dependent upon the size composition of the catch (Caillouet and Koi, 1981; Caillouet and Patella, 1979; Caillouet, Patella and Jackson, 1979 and 1980). Therefore, the timing and location of fishing have strong influences on the ex-vessel value of the shrimp caught. Seasonal fluctuations in local supply also influence price, apart from the fact that large shrimp command a higher price than do small shrimp (Poffenberger, in press).

While both detailed and summarized catch and value statistics are readily available from a variety of sources, including the National Marine Fisheries Service (NMFS), Southeast Fisheries Center (SEFC), Technical and Information Management Services (TIMS), Miami, Florida, graphically

portrayed summaries of data often have the advantage of quickly conveying information on patterns and trends. We graphed the monthly summaries of data for each year so that the monthly changes can be easily visualized and compared. For this purpose we summarized available data into cumulative monthly catch and ex-vessel value, and average monthly ex-vessel price per pound, using the reported brown shrimp catches from the Texas Coast, Mississippi River to Texas, and Pensacola to the Mississippi River (see map) for calendar years 1960 through 1981, and depicted these variables graphically.

## METHODS

### Description of Data

Monthly summations of catches (inshore and offshore combined) of brown shrimp and their ex-vessel value were compiled from data files available from the TIMS. Catches used herein represent those portions of the actual catches that were landed by commercial fishermen at domestic ports and reported by the NMFS or its predecessor, the Bureau of Commercial Fisheries, U.S. Fish and Wildlife Service. Portions of the actual catches were not reported; e.g., small shrimp discarded at sea, catches by recreational fishermen, catches sold directly to consumers, and catches by foreign fishing craft (prior to 1976). The absence of these portions in the available statistics probably has little overall effect. The weight of the reported monthly catches (inshore and offshore combined) was expressed in pounds (heads off) and the ex-vessel value in dollars (unadjusted for effects of inflation) for each year and coastal area.

Three coastal areas (see map) were distinguished as follows:

- (1) Texas coast (statistical areas 18-21 combined),
- (2) Mississippi River to Texas (statistical areas 13-17 combined), representing that part of the Louisiana coast west of the Mississippi River,
- and

- (3) Pensacola to the Mississippi River (statistical areas 10-12 combined), representing that part of the Louisiana coast east of the Mississippi River, the Mississippi coast, the Alabama coast, and a small part of the upper coast of Florida (catches from Pensacola Bay are not included in this area; they are allocated to the adjacent Apalachicola area).

Almost half of statistical area 17, as well as all of statistical areas 18-21, was included in the offshore area closed to shrimping for brown shrimp during the Texas Closure of 1981 (GMFMC, 1980). Therefore, for the years 1960 through 1980, the May-August catch statistics for the Mississippi River to Texas coastal area represented a somewhat larger zone than was the case during 1981 as a result of the Texas Closure in 1981.

#### Data Summaries

For each coastal area, the monthly catches of brown shrimp were cumulated within each calendar year; thus, the cumulative catch for January was the same as the monthly catch for January, the cumulative catch through the month of February was equal to the combined monthly catches of January and February, and so on, until the cumulative catch through the month of December was equal to the annual catch in a given calendar year. The monthly ex-vessel value was cumulated by the same procedure. Finally, for each month, the actual (not cumulative) ex-vessel value was divided by the actual catch to calculate the average monthly ex-vessel price per pound. The three variables; cumulative catch, cumulative ex-vessel value, and average monthly ex-vessel price per pound were then plotted by month for each year and each coastal area.

#### Graphs

Our graphs are organized chronologically, from 1960 to 1981; within each year, triplicates representing the three coastal areas are organized in the following order: Texas Coast, Mississippi River to Texas, and Pensacola to the Mississippi River. Symbols and units appearing in the graphs are defined as follows:

- (1) cumulative monthly catch is represented by connected circles and expressed in millions of pounds;
- (2) cumulative monthly ex-vessel value of the catch is represented by connected triangles and expressed in millions of dollars;
- (3) average monthly ex-vessel price per pound is represented by connected x's and expressed in dollars per pound.

#### GENERAL OBSERVATIONS

As expected, the trends in the cumulative monthly catches and ex-vessel value of the catches follow a sigmoid pattern. The effects of new recruitment each year were depicted by the rapid upward trends in cumulative catch and ex-vessel value of the catch, beginning in spring or early summer, which slowed later in the year as the annual maxima were approached. The curves for cumulative catch reached higher levels (millions of pounds) than did those for cumulative ex-vessel value of the catch (millions of dollars) from 1960 through 1971. From 1972 through 1975, these two curves varied in height relative to one another, with greatest separation occurring on the Texas Coast, in which the ex-vessel value consistently reached higher levels (millions) than did the weight of the catch. From 1976 through 1981, the curves for cumulative ex-vessel value consistently reached higher levels than did those for cumulative catch in all three coastal areas, with the curves for the Texas coast having the widest separation, those for the Mississippi River to Texas having intermediate separation, and those for Pensacola to the Mississippi River having the least separation. Obviously, the degree of separation between the curves for cumulative weight and cumulative value reflects the magnitude of the average monthly price per pound. Because the size of brown shrimp in the catch from the Texas Coast is generally larger than that for the other two coastal areas (Caillouet and Koi, 1981; Caillouet and Patella, 1978; Caillouet, Patella and Jackson, 1979 and 1980), the average price per pound for brown shrimp in the Texas catch is generally higher than that in the other two coastal areas.

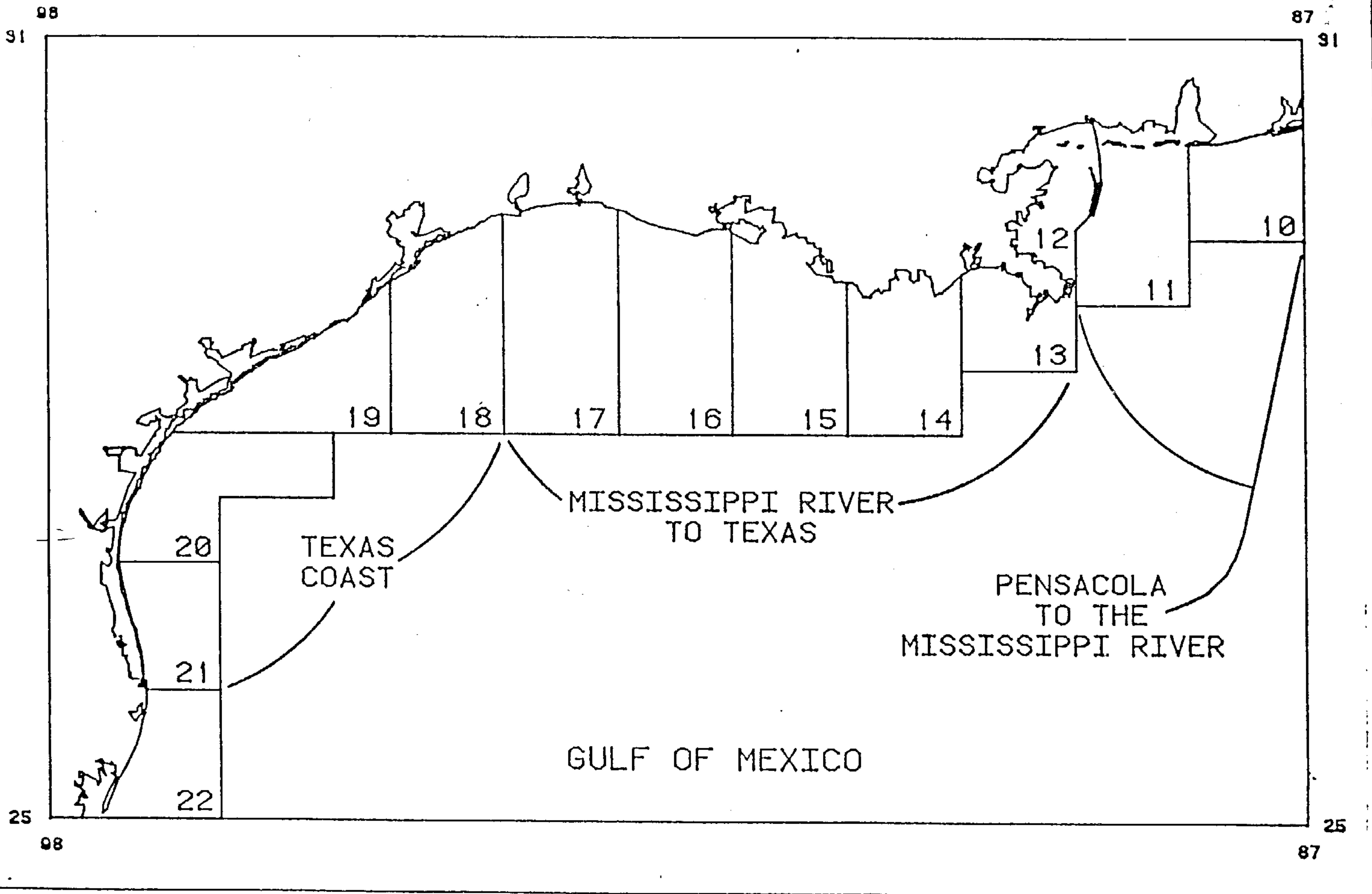


The general pattern in average monthly price per pound was that of a relatively sharp drop with the onset of the new recruitment in spring or early summer, followed by gradual recovery and stabilization by late fall and winter, with levels more or less sustained until the onset of the next year's shrimp crop. These monthly variations in price per pound became more dramatic with time, with the widest excursion in price per pound occurring within 1981, during which the first Texas Closure occurred.

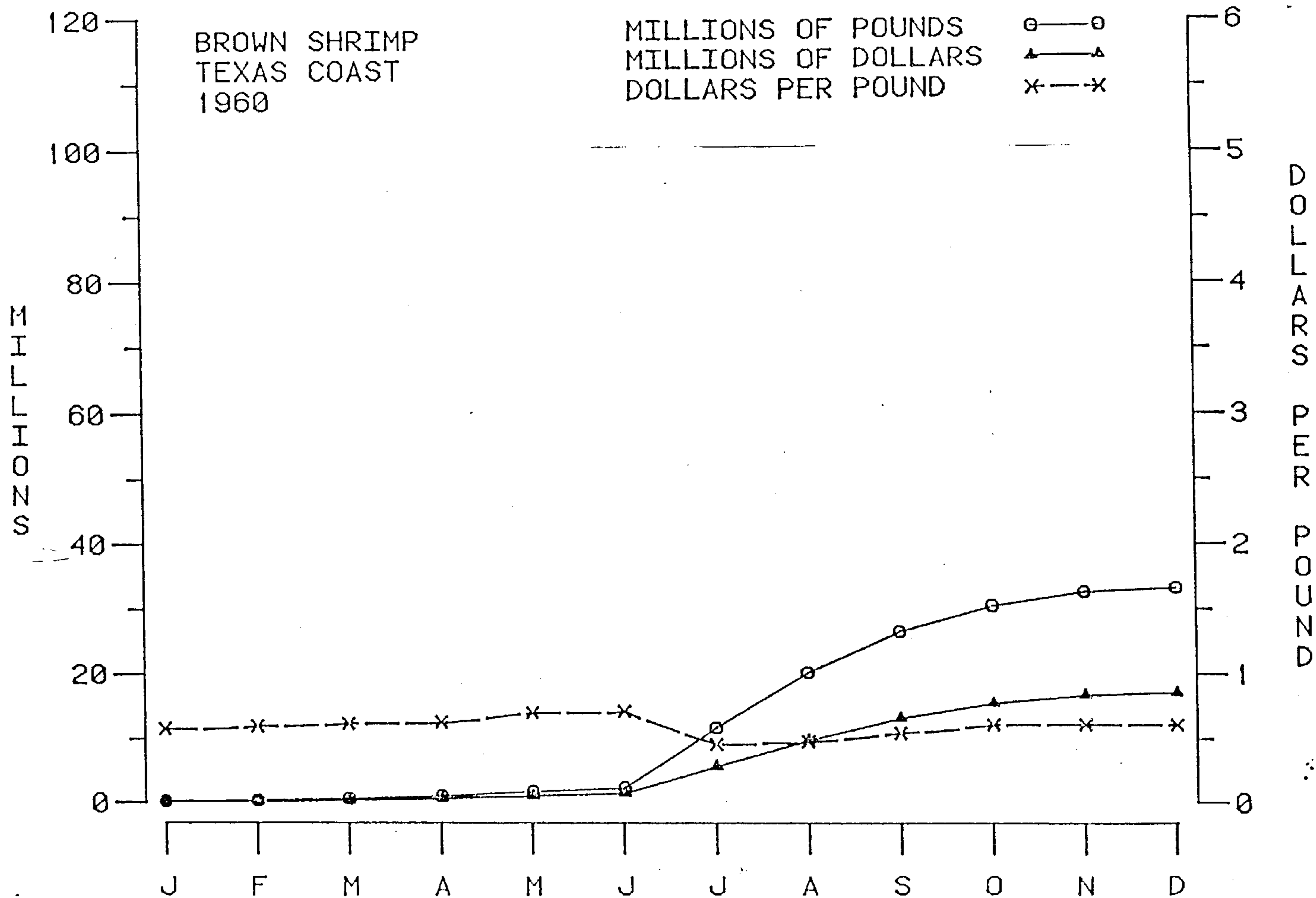
Our graphs provide an opportunity for easy inspection of fluctuations, seasonal patterns, and trends. They should be of use to those interested in the seasonal dynamics of catch, ex-vessel value and price per pound. Finally, the sigmoid patterns exhibited by cumulative catch and value curves suggest that they might be treated as "growth" curves, thus lending themselves to representation by various growth functions capable of characterizing year to year variations and trends, and to prediction of annual total catch and ex-vessel value of catch based upon a few months of data from each new crop. In this regard, it would be best to use a "biological year", starting with the month in which the new crop appeared (in spring or early summer) and continuing until the month preceeding the next year's new crop, rather than using calendar years.

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- Poffenberger, J. (1982). An analysis of price and value for shrimp landed at Texas and Louisiana ports by size categories. Marine Fisheries Review (in press).







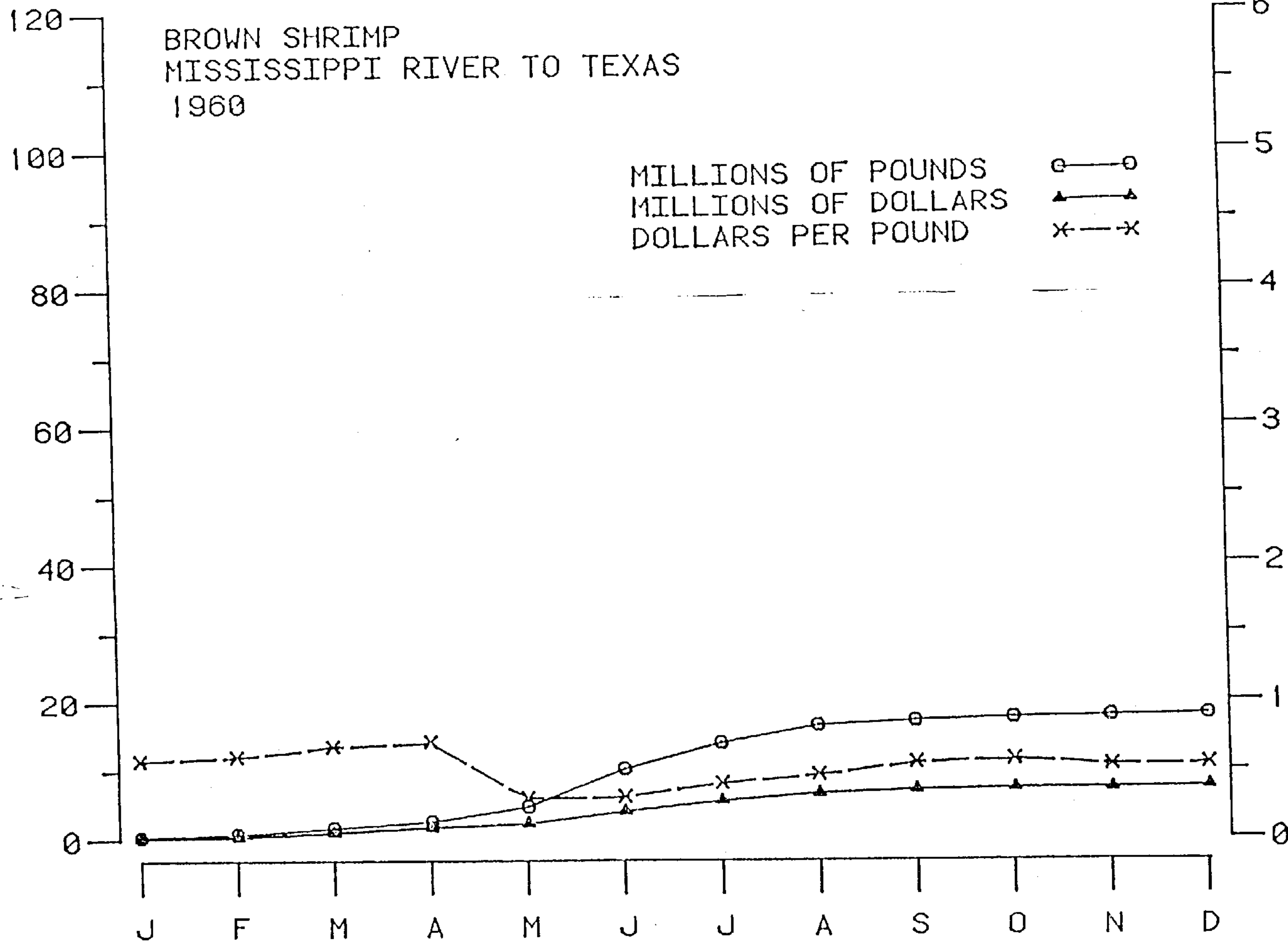
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MISSISSIPPI RIVER TO TEXAS  
1960

MILLIONS

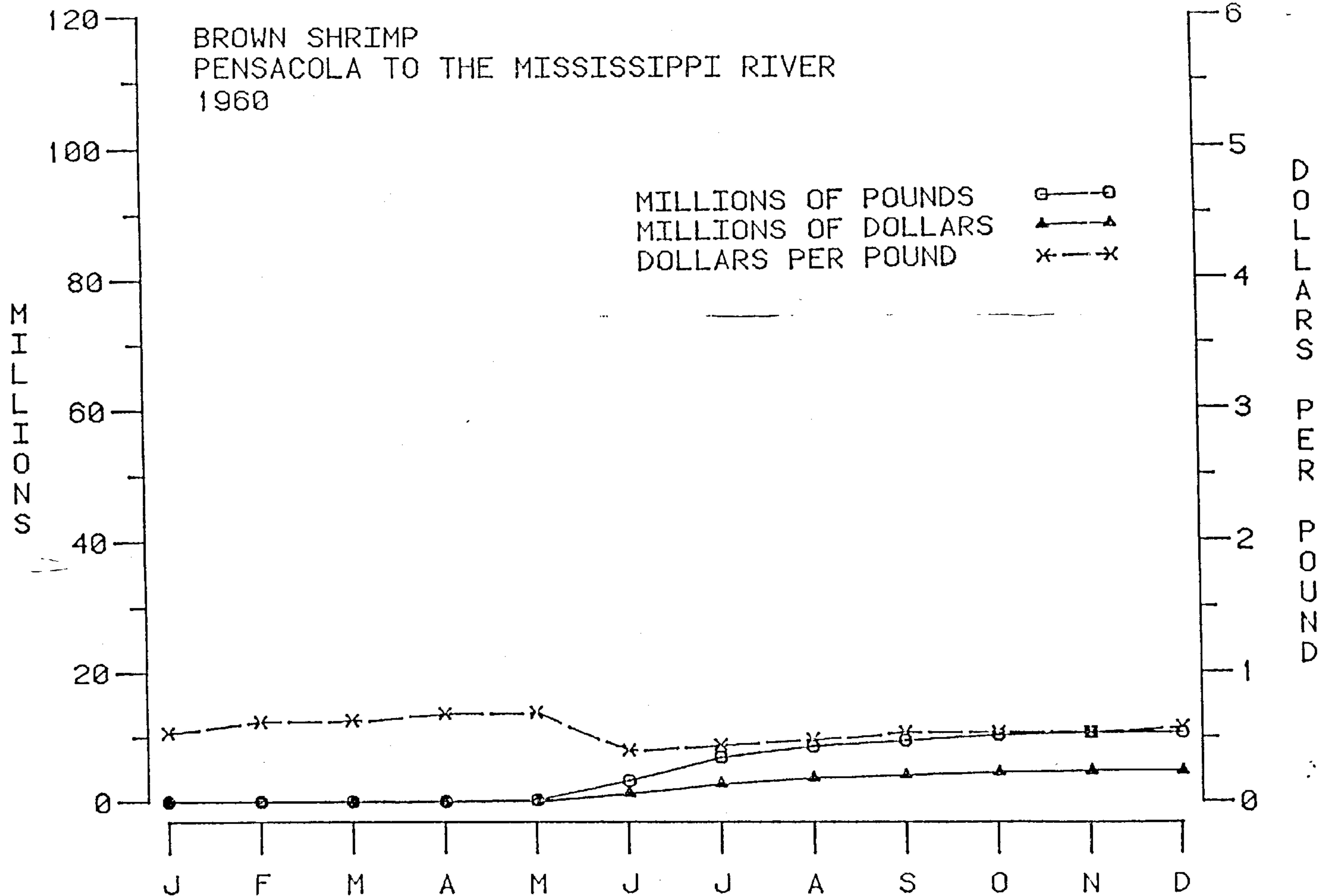
MILLIONS OF POUNDS  
MILLIONS OF DOLLARS  
DOLLARS PER POUND

○—○  
▲—▲  
×—×

DOLLARS PER POUND



BROWN SHRIMP  
PENSACOLA TO THE MISSISSIPPI RIVER  
1960



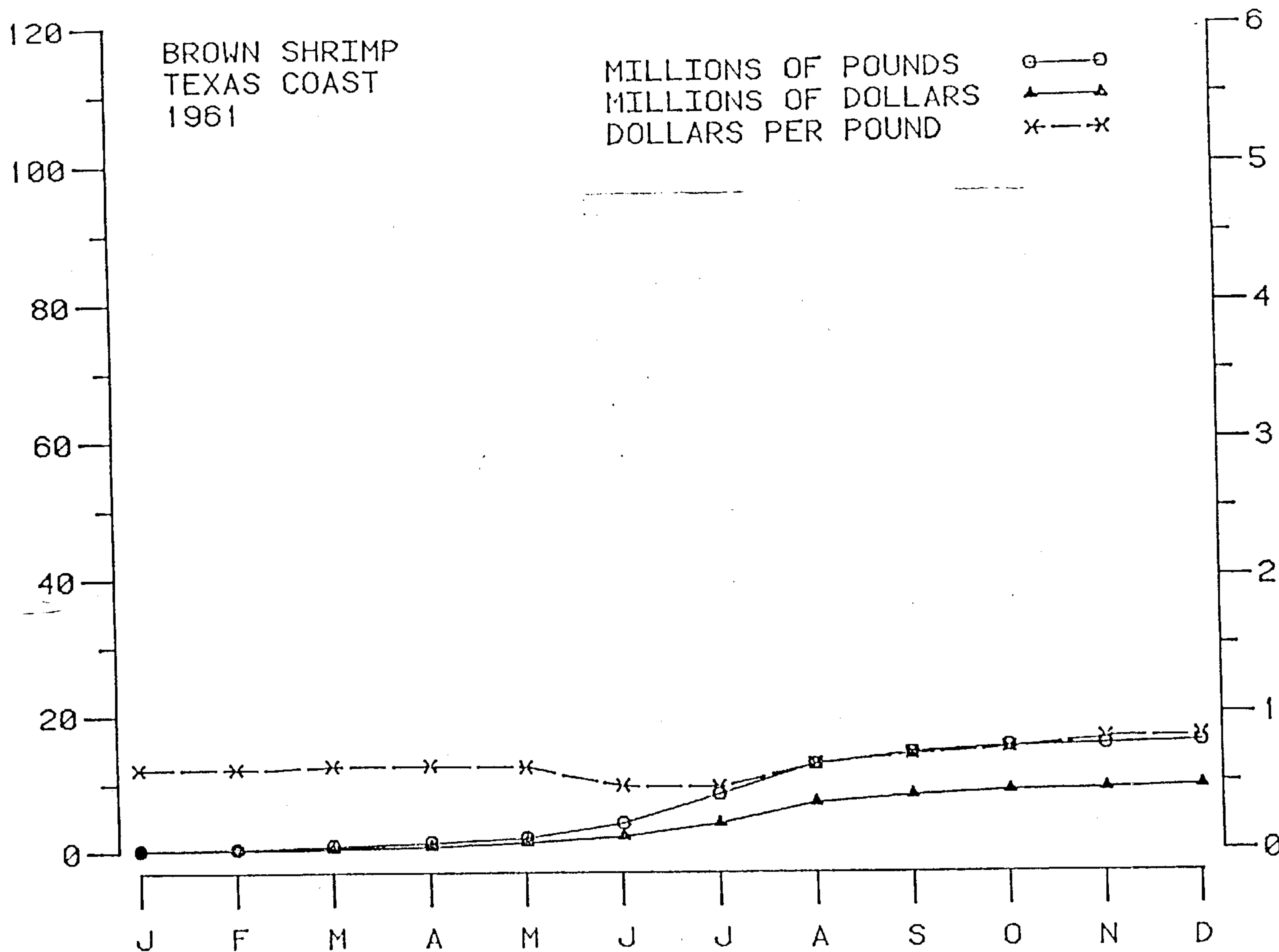
BROWN SHRIMP  
TEXAS COAST  
1961

MILLIONS OF POUNDS  
MILLIONS OF DOLLARS  
DOLLARS PER POUND

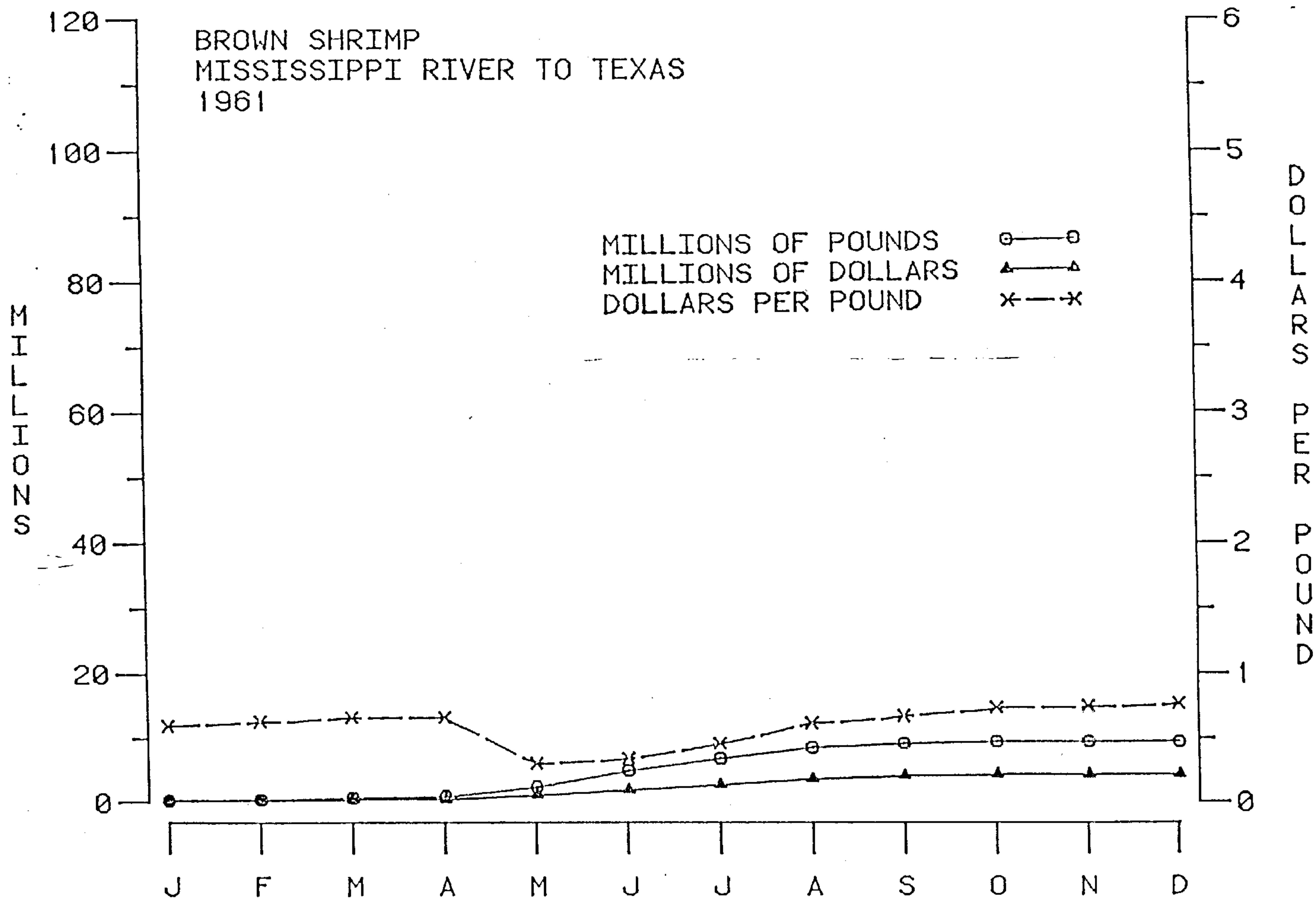
○—○  
▲—▲  
×—×

MILLIONS

DOLLARS PER POUND



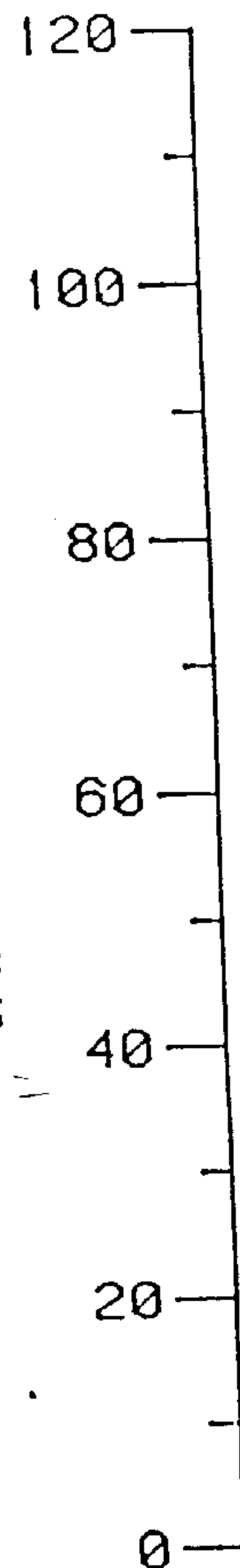
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MISSISSIPPI RIVER TO TEXAS  
1961





BROWN SHRIMP  
PENSACOLA TO THE MISSISSIPPI RIVER  
1961

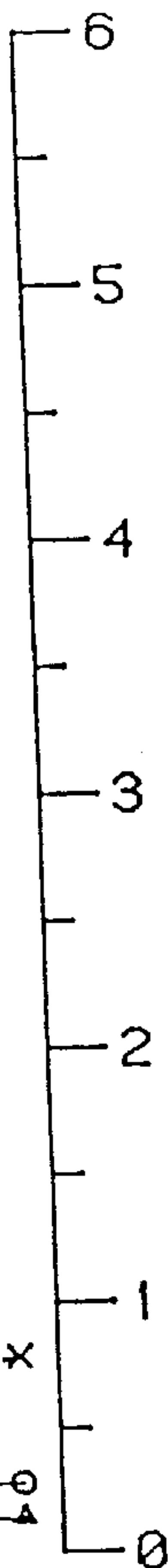
MILLIONS



MILLIONS OF POUNDS  
MILLIONS OF DOLLARS  
DOLLARS PER POUND

○—○  
▲—▲  
x—x

DOLLARS  
PER  
POUND



J F M A M J J A S O N D

0

20

40

60

80

100

120

0

1

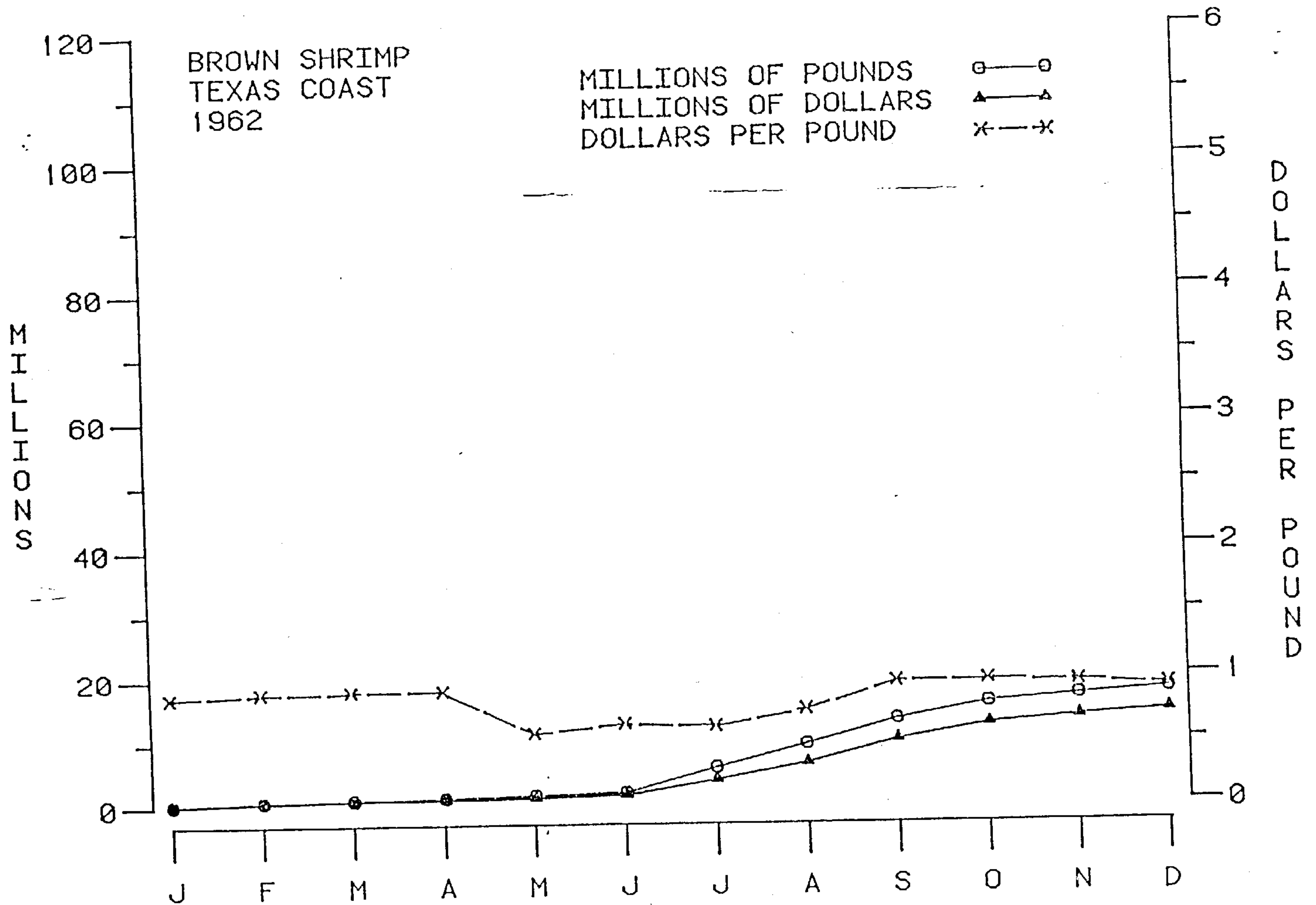
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3

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6



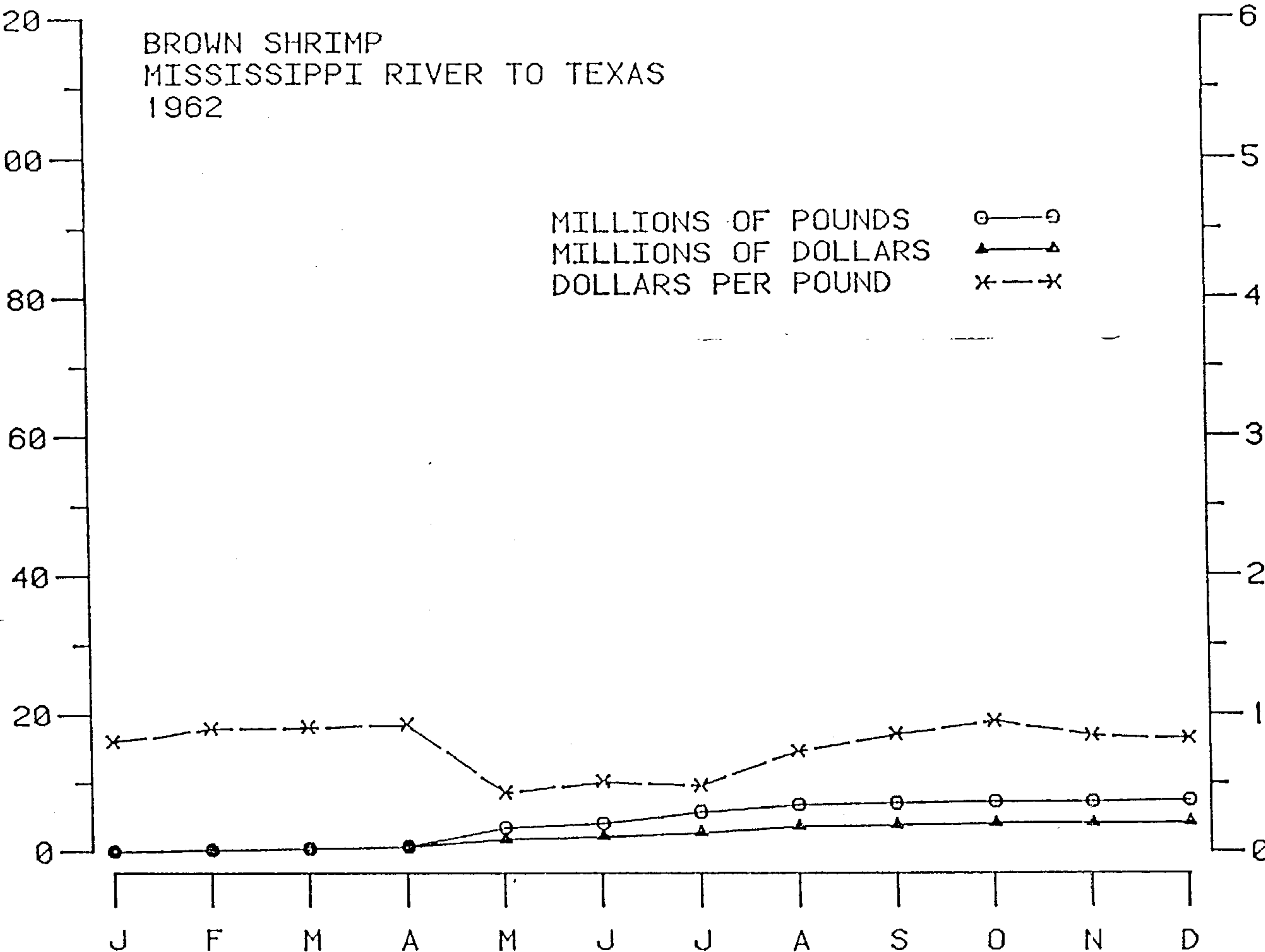
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MISSISSIPPI RIVER TO TEXAS  
1962

MILLIONS

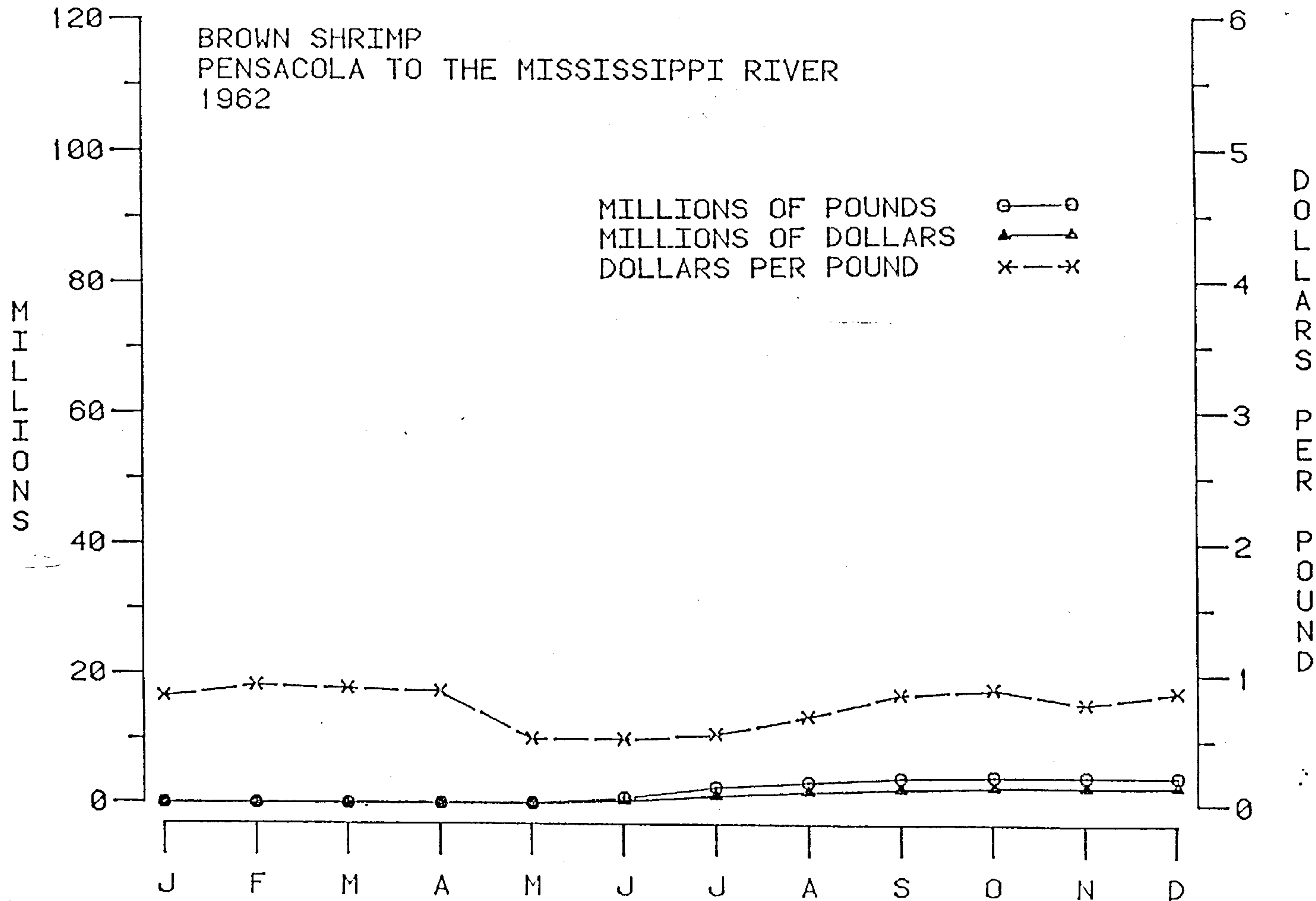
MILLIONS OF POUNDS  
MILLIONS OF DOLLARS  
DOLLARS PER POUND

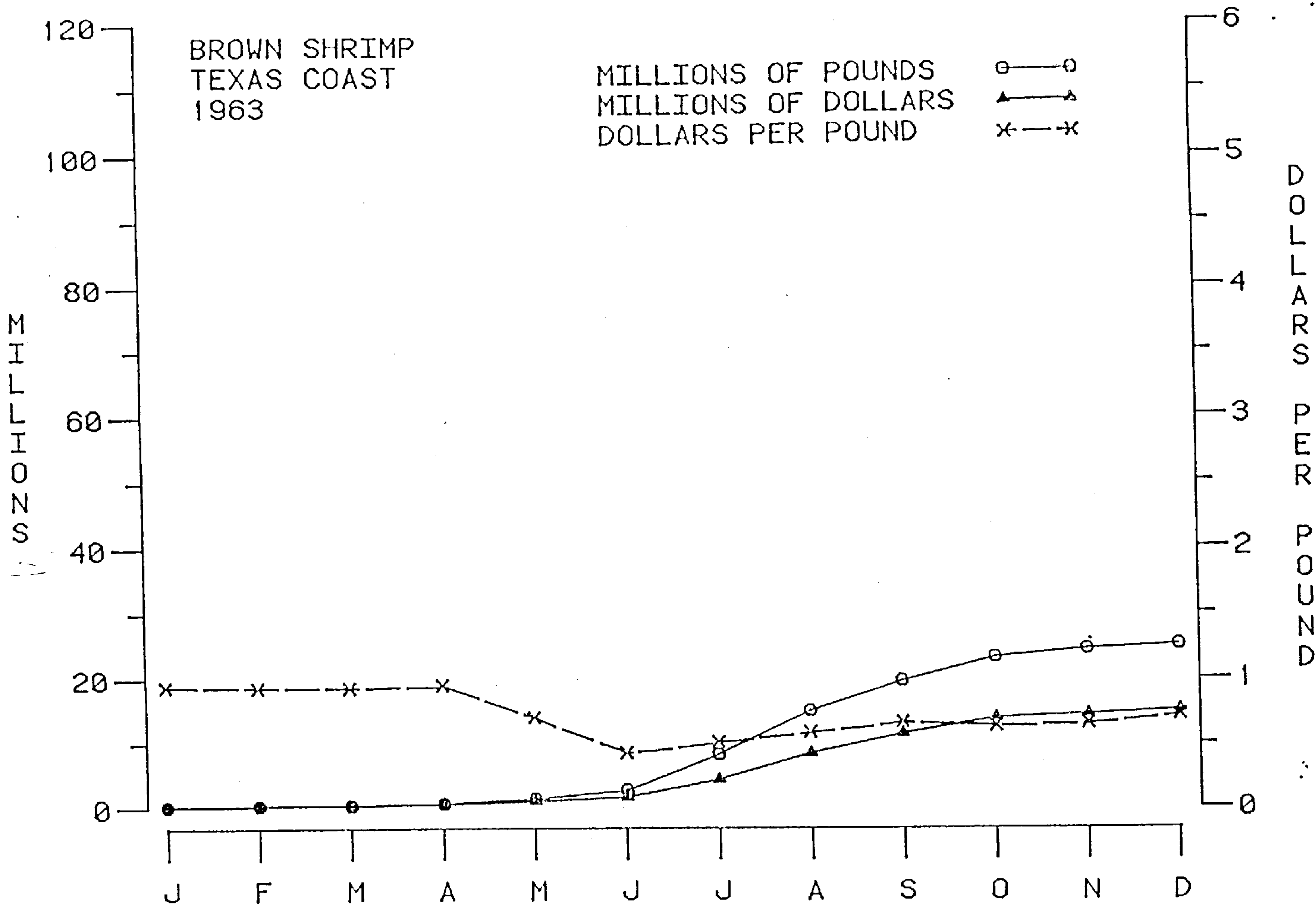
○—○  
▲—▲  
×—×

DOLLARS PER POUND



BROWN SHRIMP  
PENSACOLA TO THE MISSISSIPPI RIVER  
1962







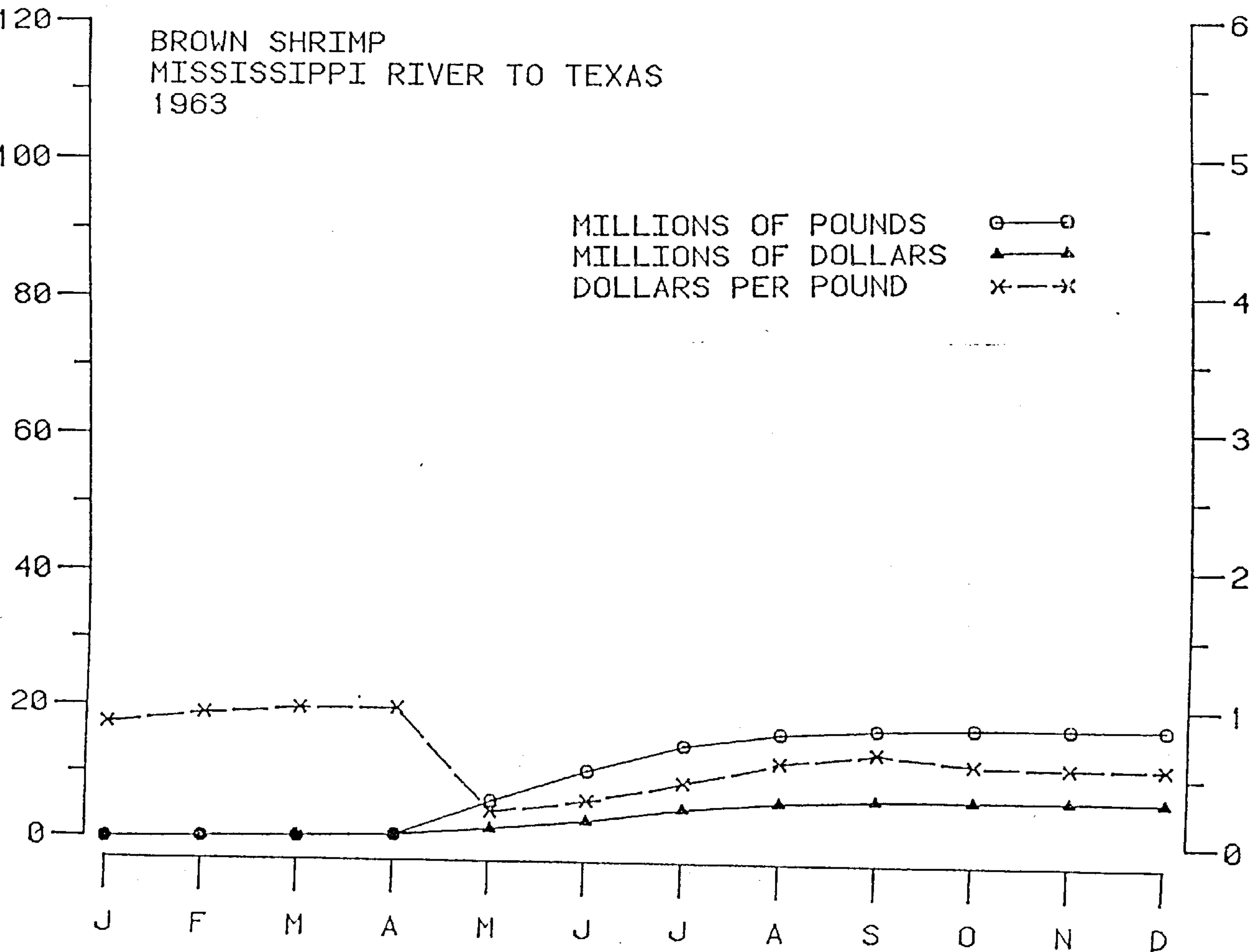
BROWN SHRIMP  
MISSISSIPPI RIVER TO TEXAS  
1963

MILLIONS

MILLIONS OF POUNDS  
MILLIONS OF DOLLARS  
DOLLARS PER POUND

○—○  
▲—▲  
×—×

DOLLARS PER POUND

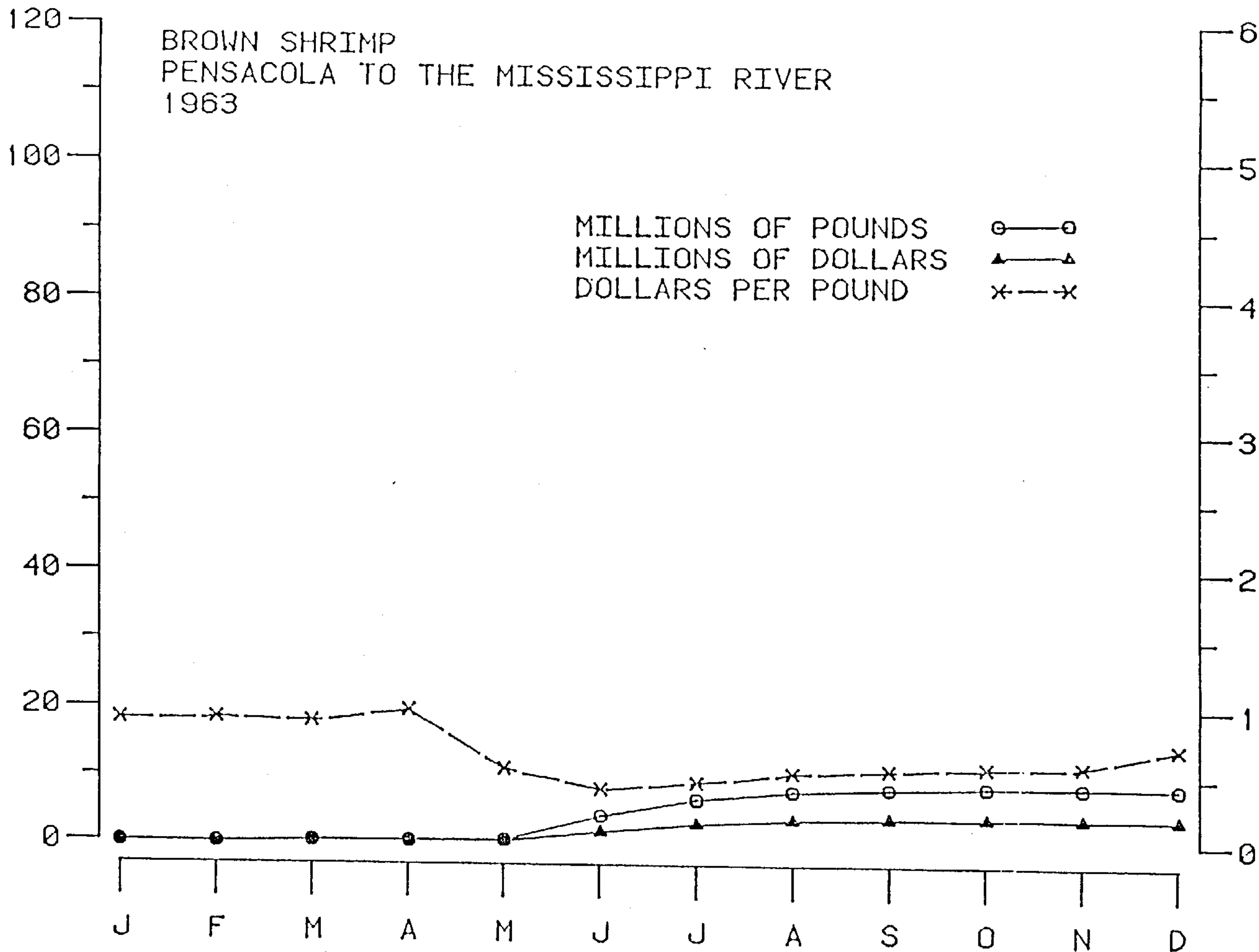


BROWN SHRIMP  
PENSACOLA TO THE MISSISSIPPI RIVER  
1963

MILLIONS OF POUNDS  
MILLIONS OF DOLLARS  
DOLLARS PER POUND

MILLIONS

DOLLARS PER POUND



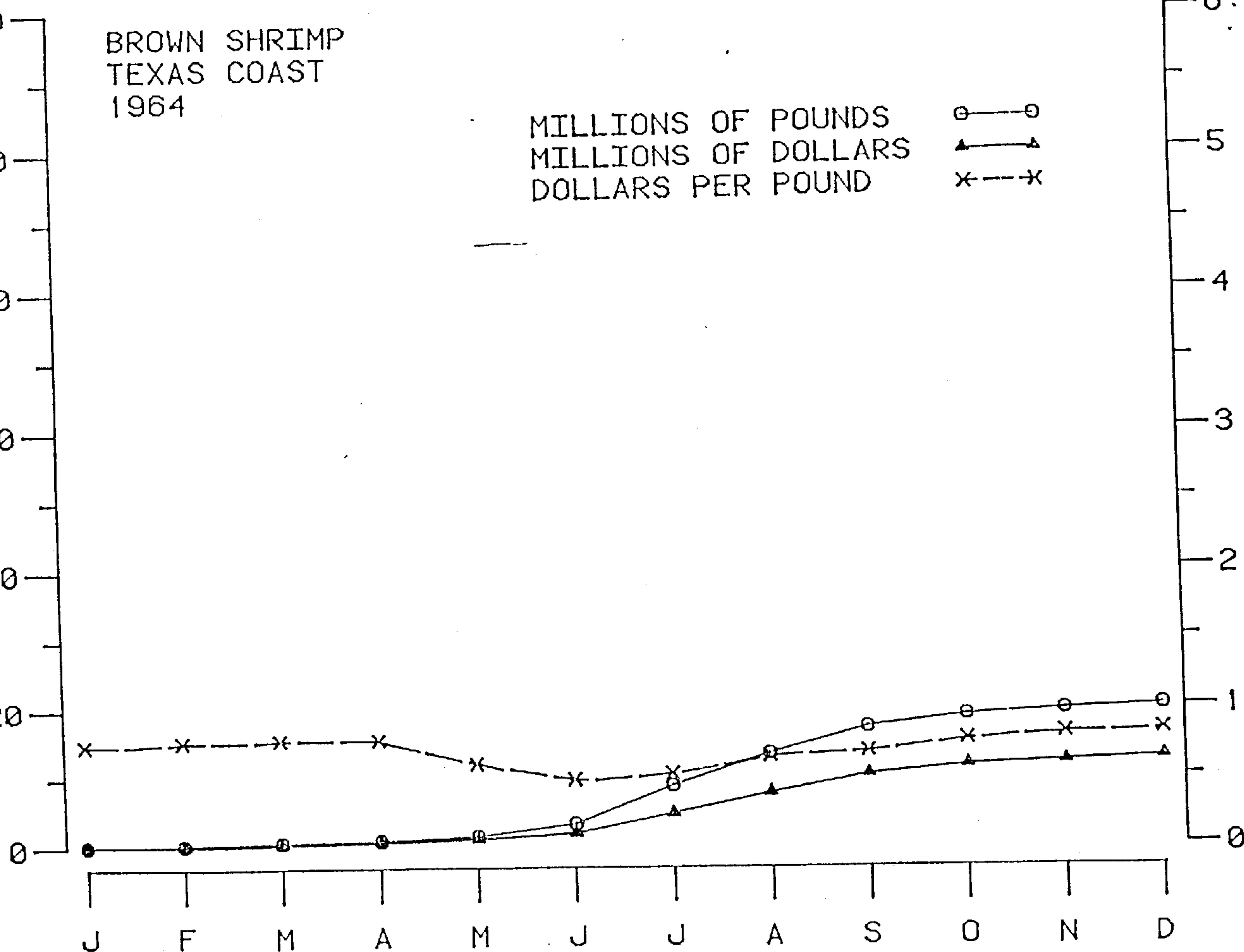
BROWN SHRIMP  
TEXAS COAST  
1964

MILLIONS OF POUNDS  
MILLIONS OF DOLLARS  
DOLLARS PER POUND

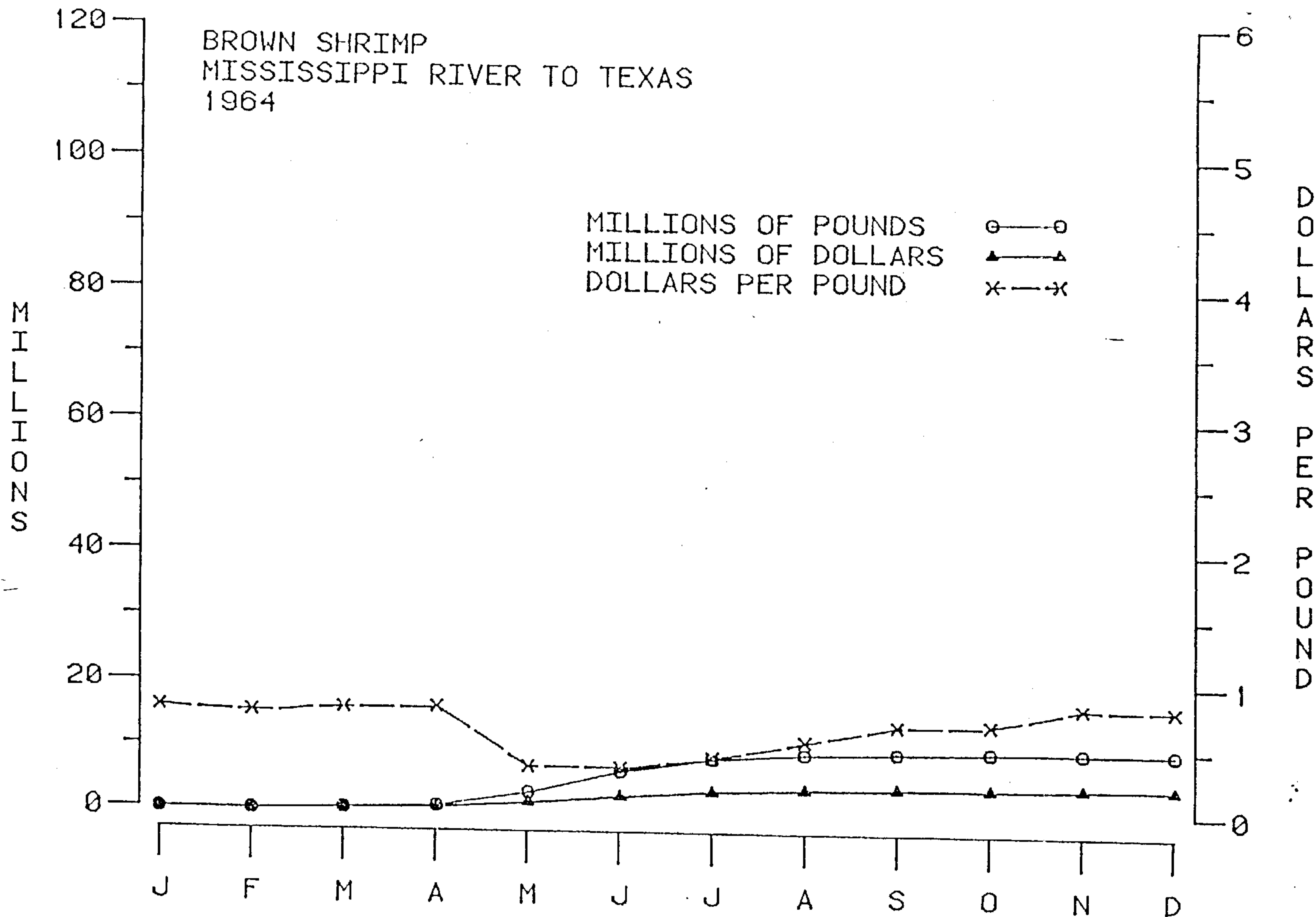
○—○  
▲—▲  
×—×

MILLIONS

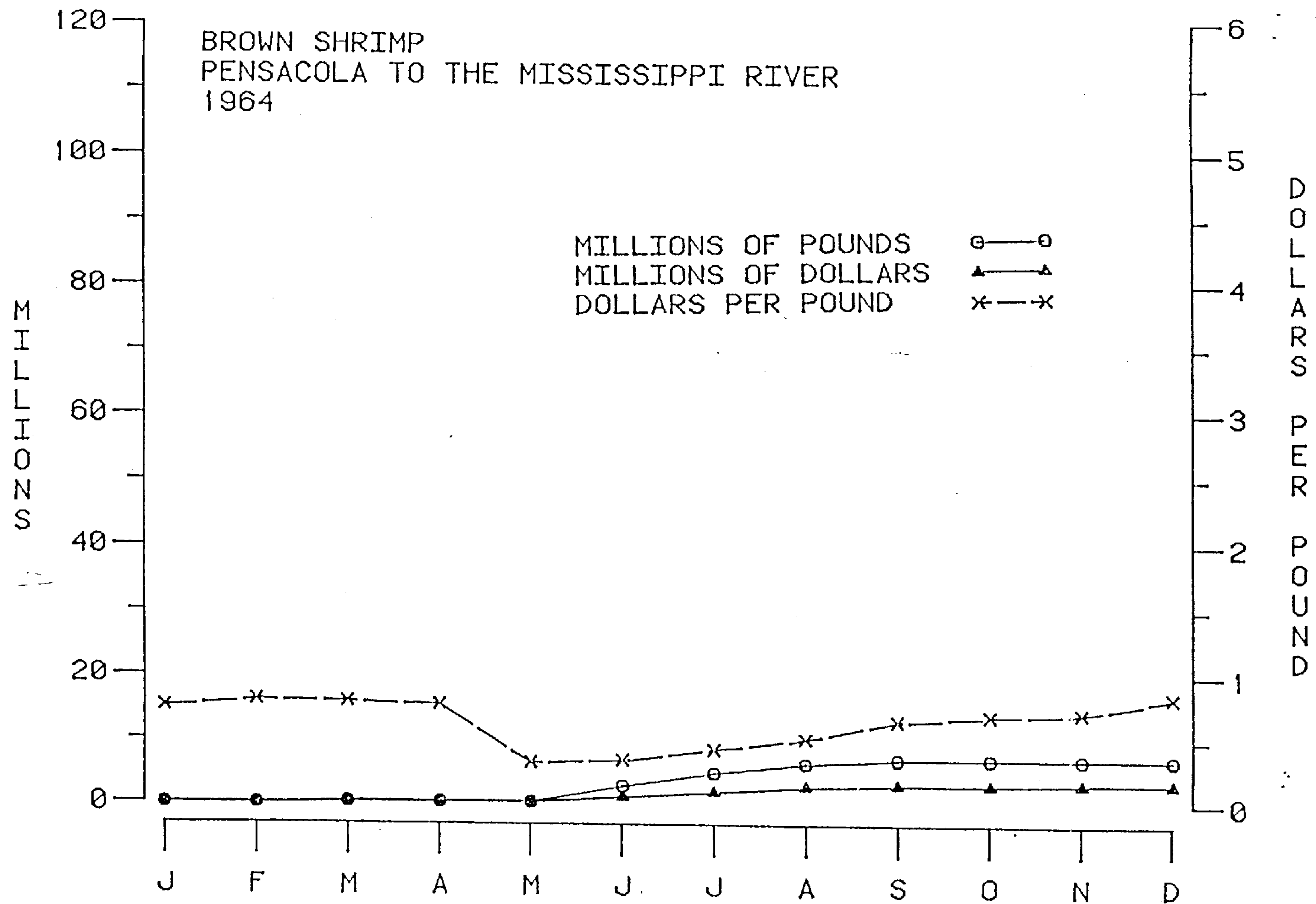
DOLLARS PER POUND



BROWN SHRIMP  
MISSISSIPPI RIVER TO TEXAS  
1964



# BROWN SHRIMP PENSACOLA TO THE MISSISSIPPI RIVER 1964





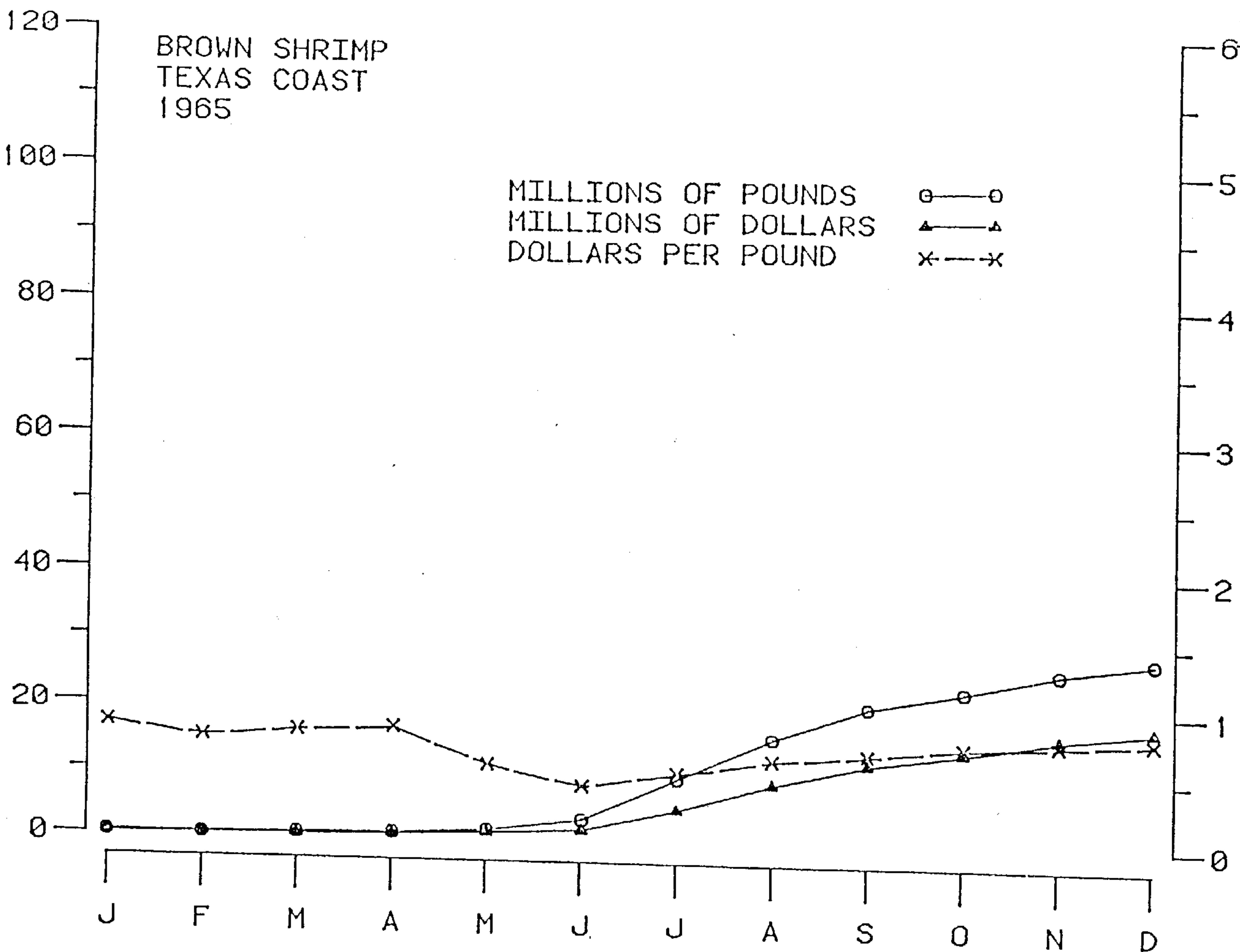
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TEXAS COAST  
1965

MILLIONS OF POUNDS  
MILLIONS OF DOLLARS  
DOLLARS PER POUND

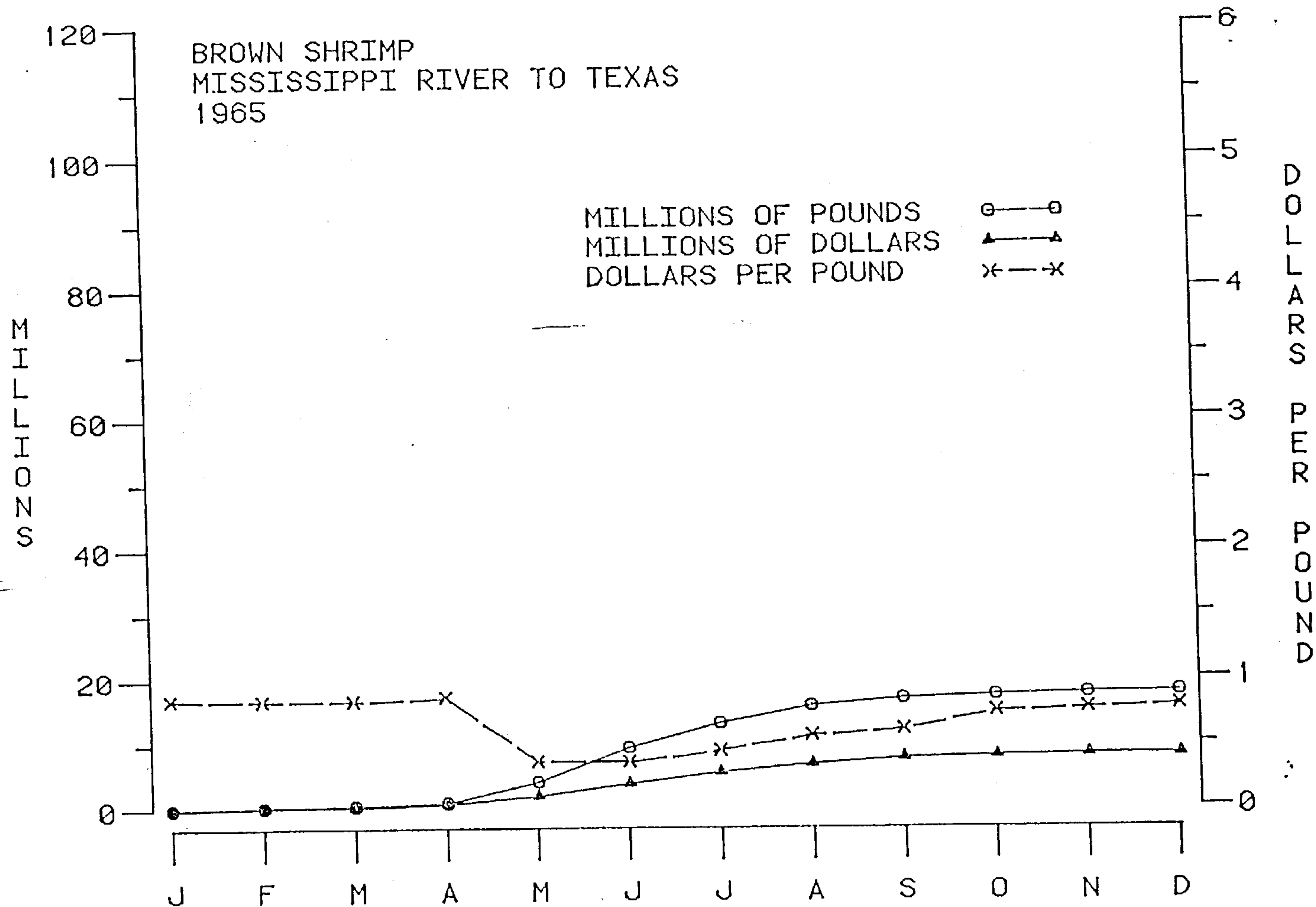
○—○  
▲—▲  
x—x

MILLIONS

DOLLARS PER POUND



BROWN SHRIMP  
MISSISSIPPI RIVER TO TEXAS  
1965



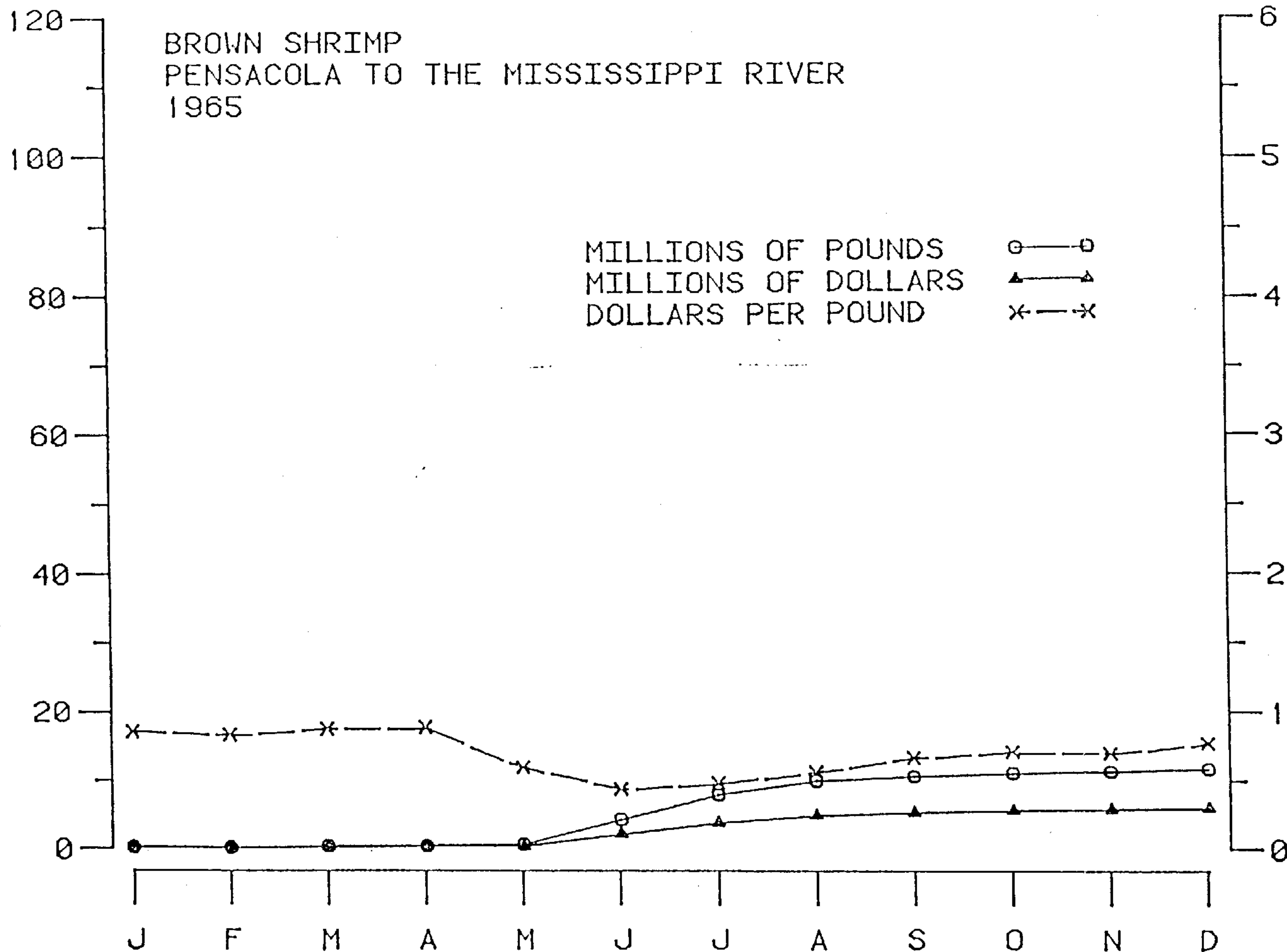
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PENSACOLA TO THE MISSISSIPPI RIVER  
1965

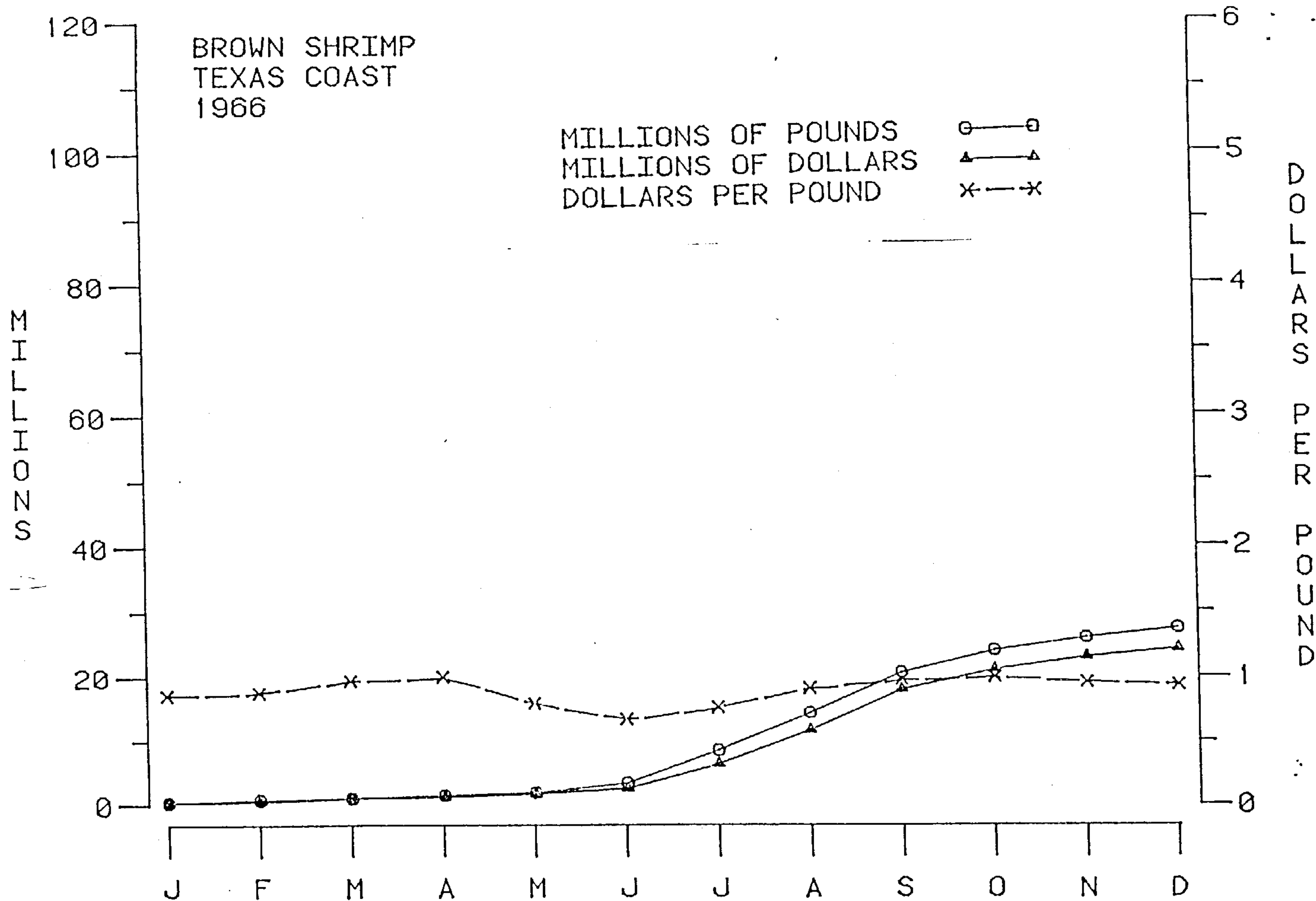
MILLIONS OF POUNDS

MILLIONS OF POUNDS  
MILLIONS OF DOLLARS  
DOLLARS PER POUND

○—○  
▲—▲  
×—×

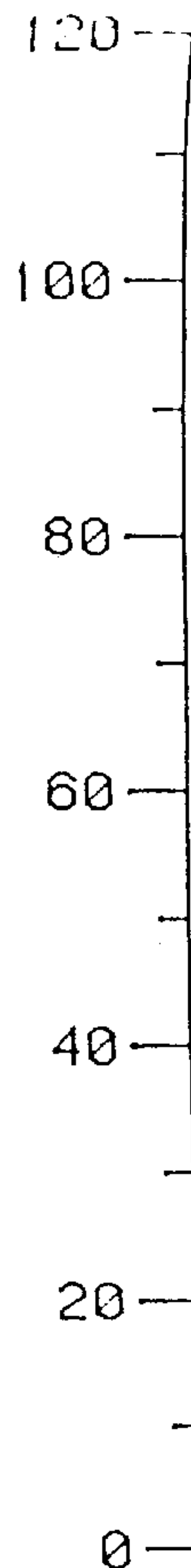
DOLLARS PER POUND





BROWN SHRIMP  
MISSISSIPPI RIVER TO TEXAS  
1966

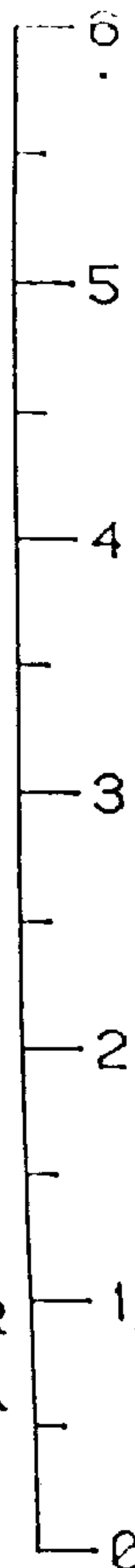
MILLIONS



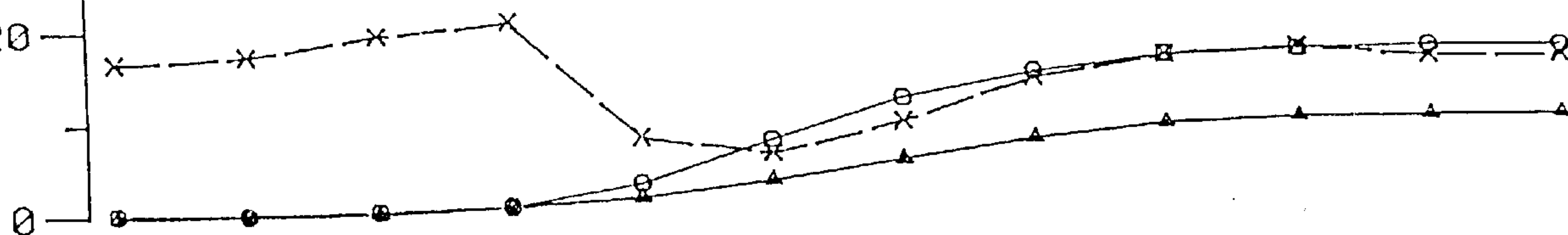
MILLIONS OF POUNDS  
MILLIONS OF DOLLARS  
DOLLARS PER POUND

○—○  
▲—▲  
×—×

DOLLARS PER POUND



J F M A M J J A S O N D





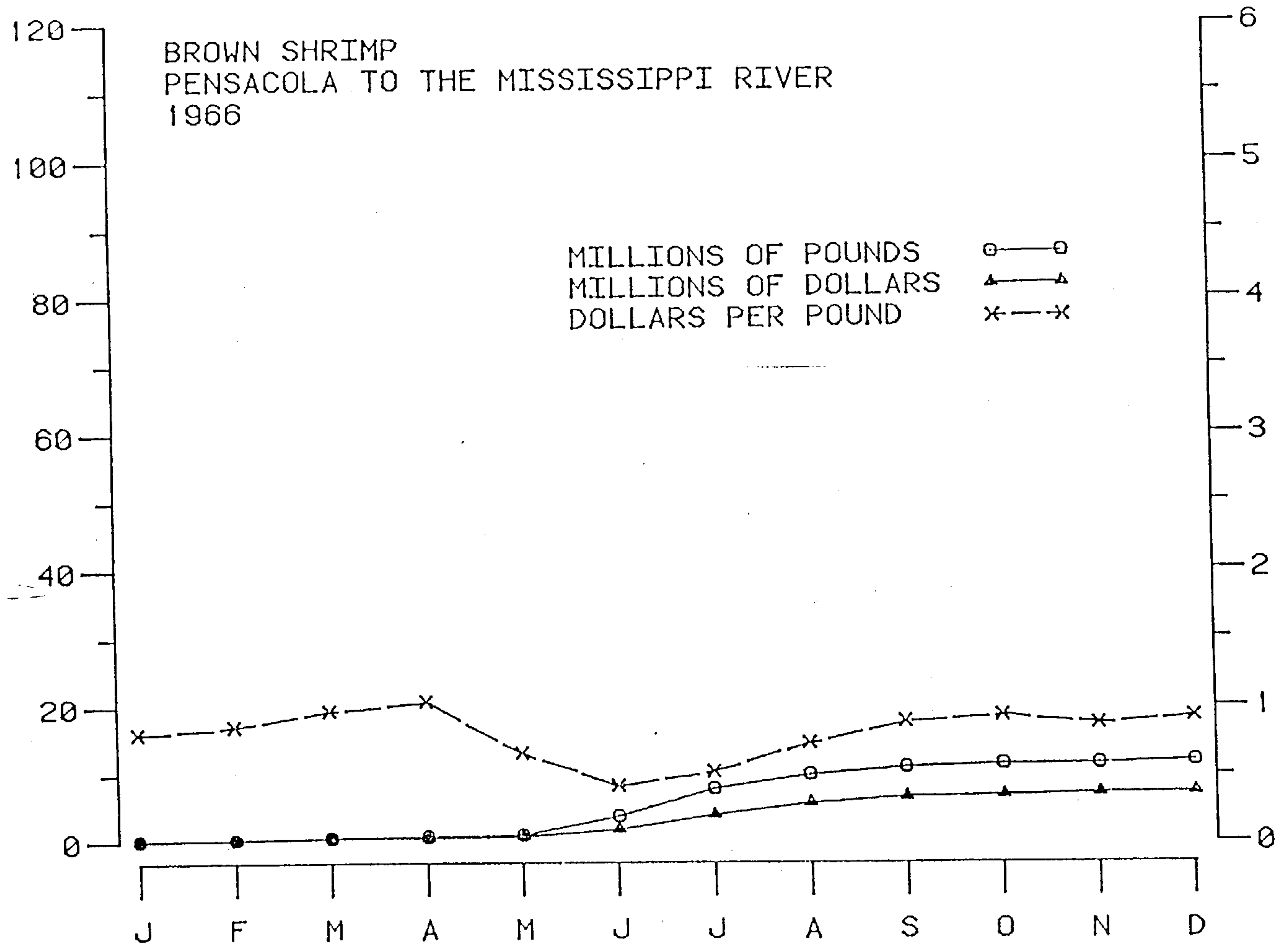
BROWN SHRIMP  
PENSACOLA TO THE MISSISSIPPI RIVER  
1966

MILLIONS

MILLIONS OF POUNDS  
MILLIONS OF DOLLARS  
DOLLARS PER POUND

○—○  
△—△  
×—×

DOLLARS PER POUND



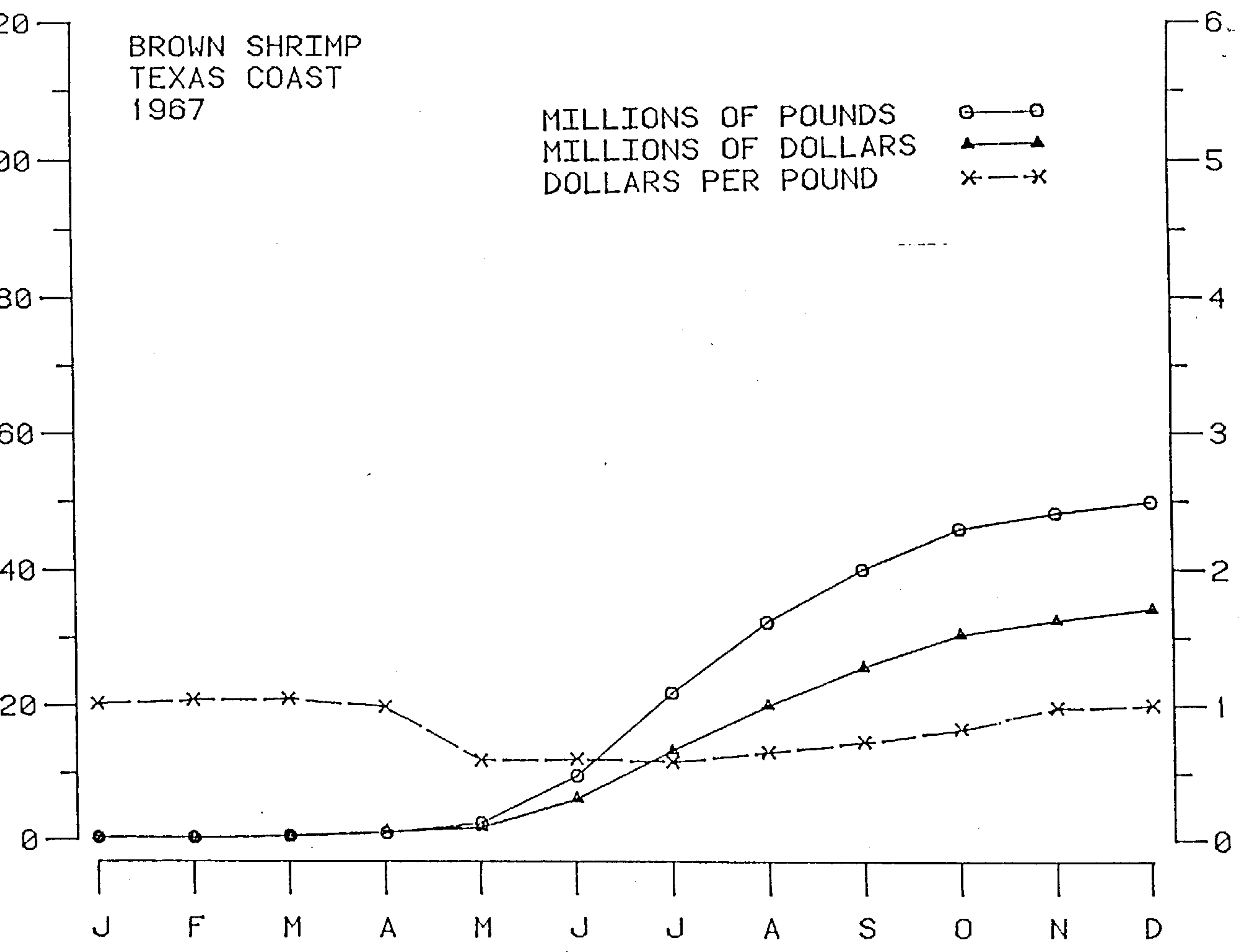
BROWN SHRIMP  
TEXAS COAST  
1967

MILLIONS OF POUNDS  
MILLIONS OF DOLLARS  
DOLLARS PER POUND

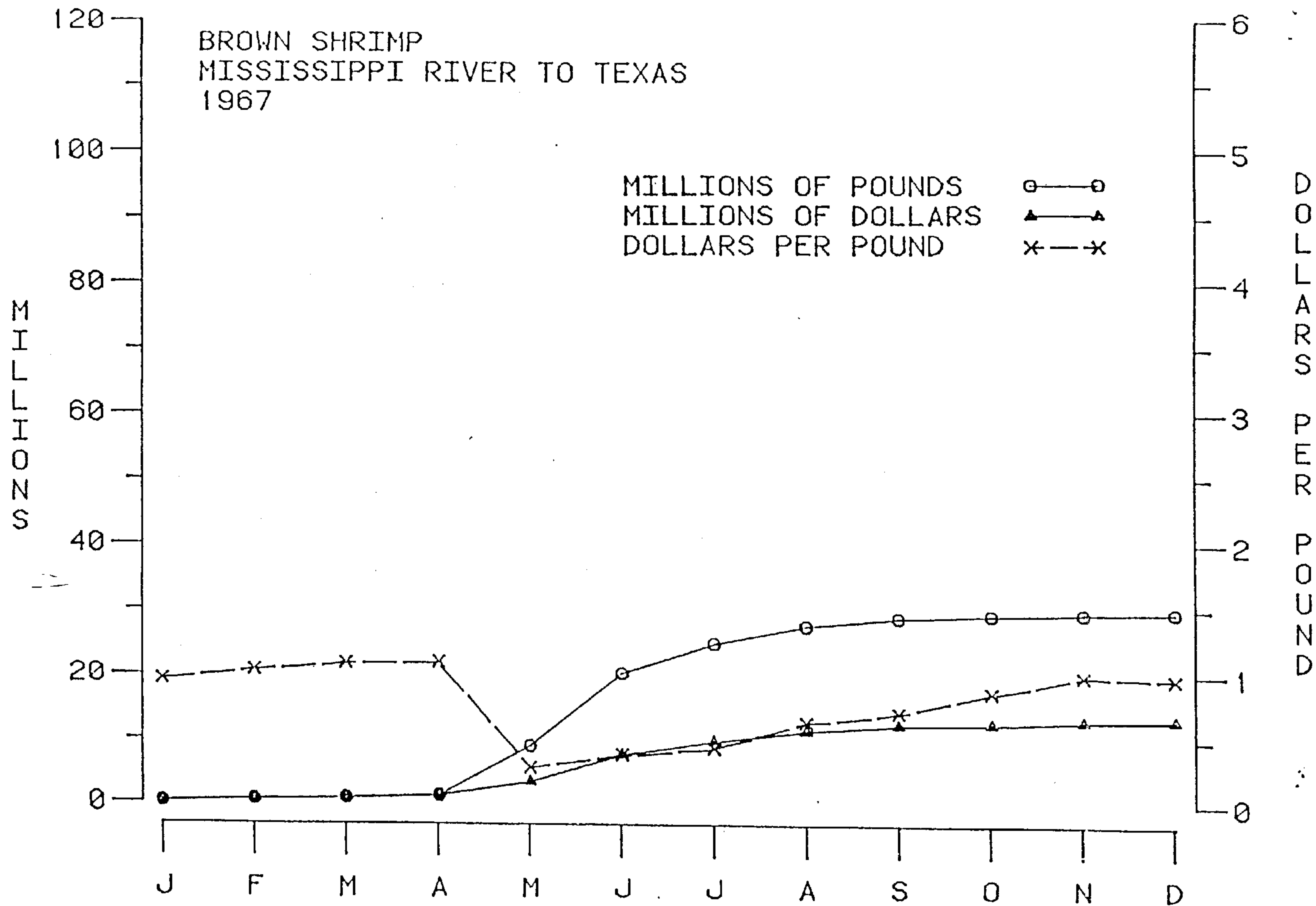
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▲—▲  
×—×

MILLIONS

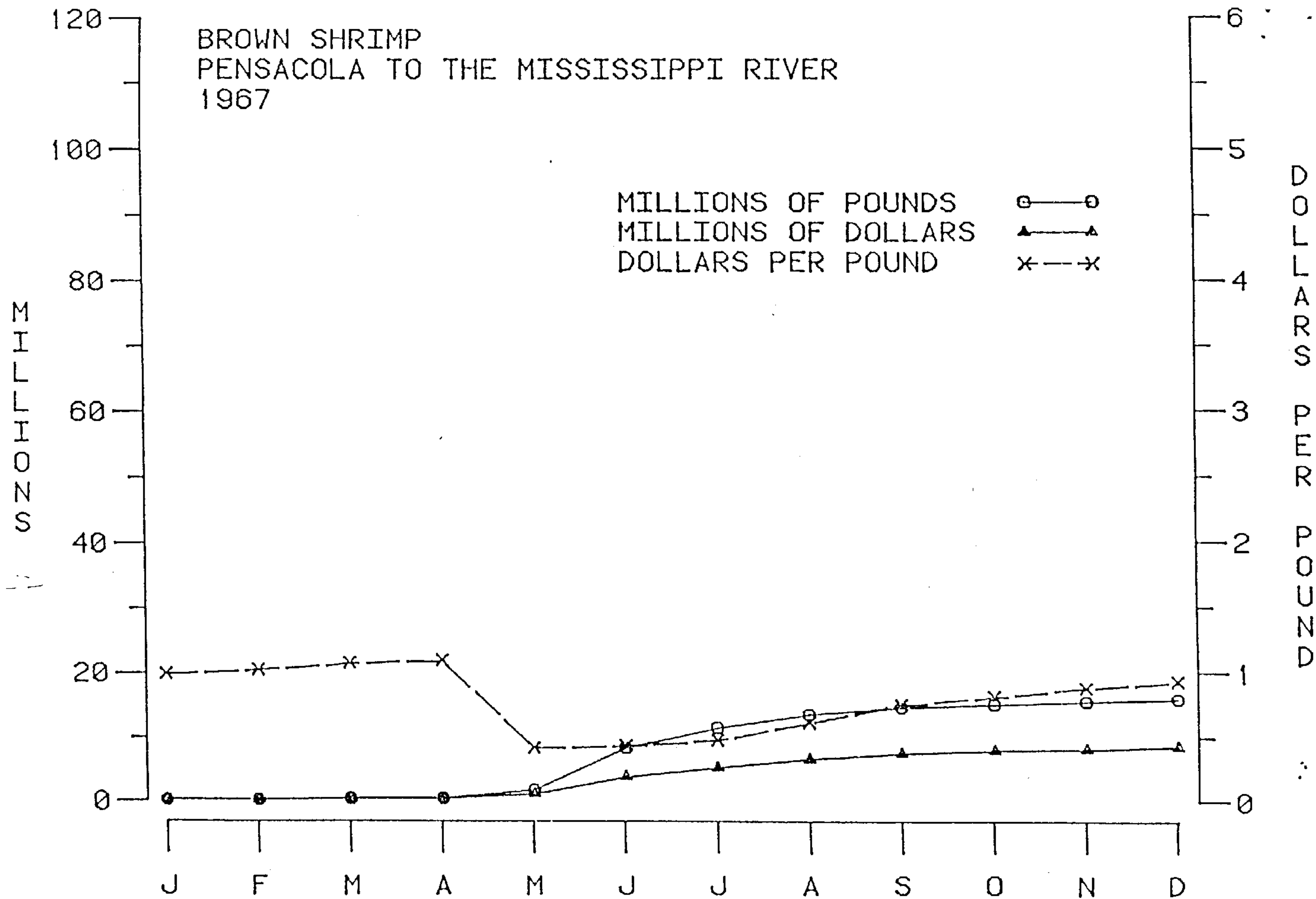
DOLLARS PER POUND

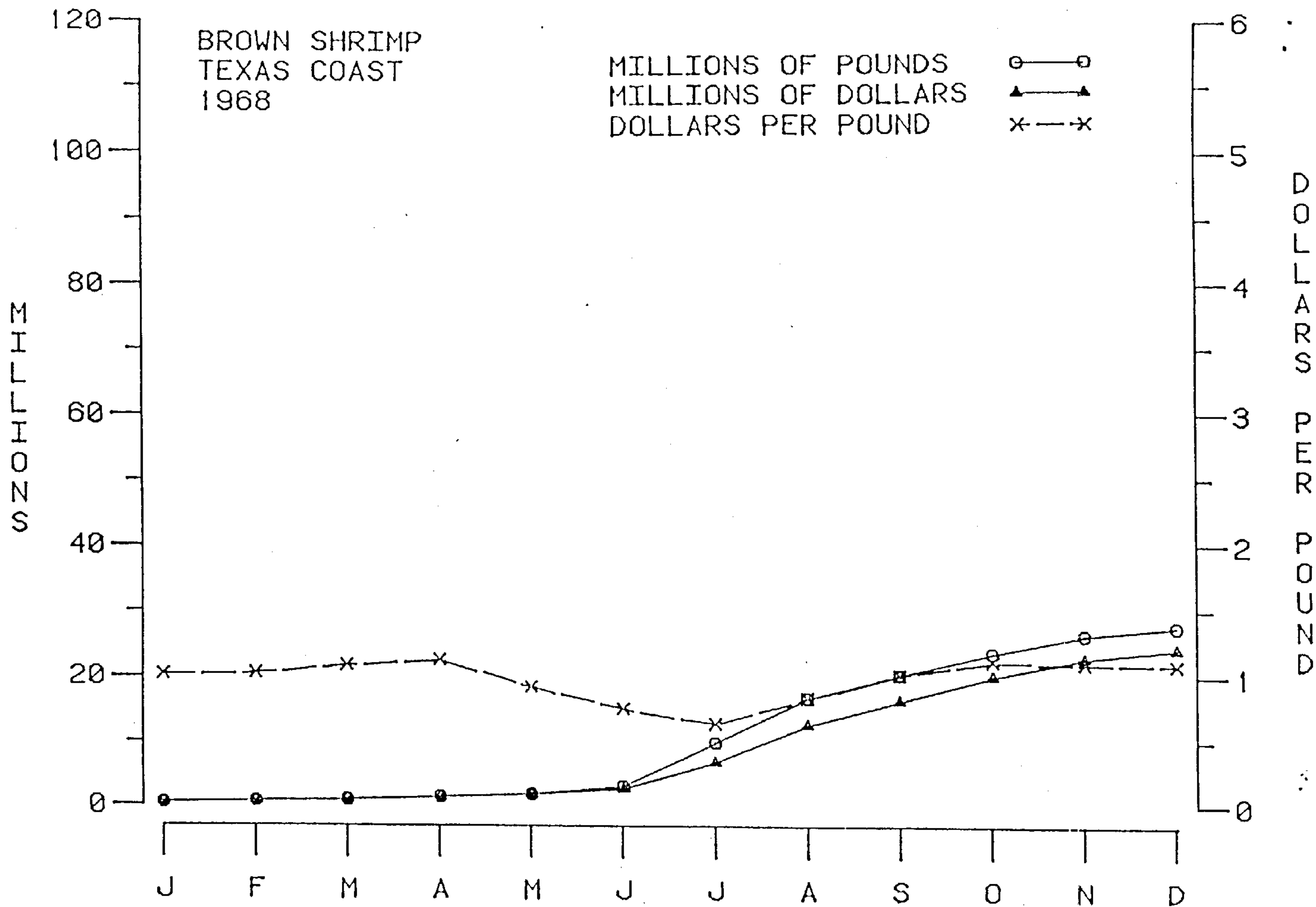


# BROWN SHRIMP MISSISSIPPI RIVER TO TEXAS 1967

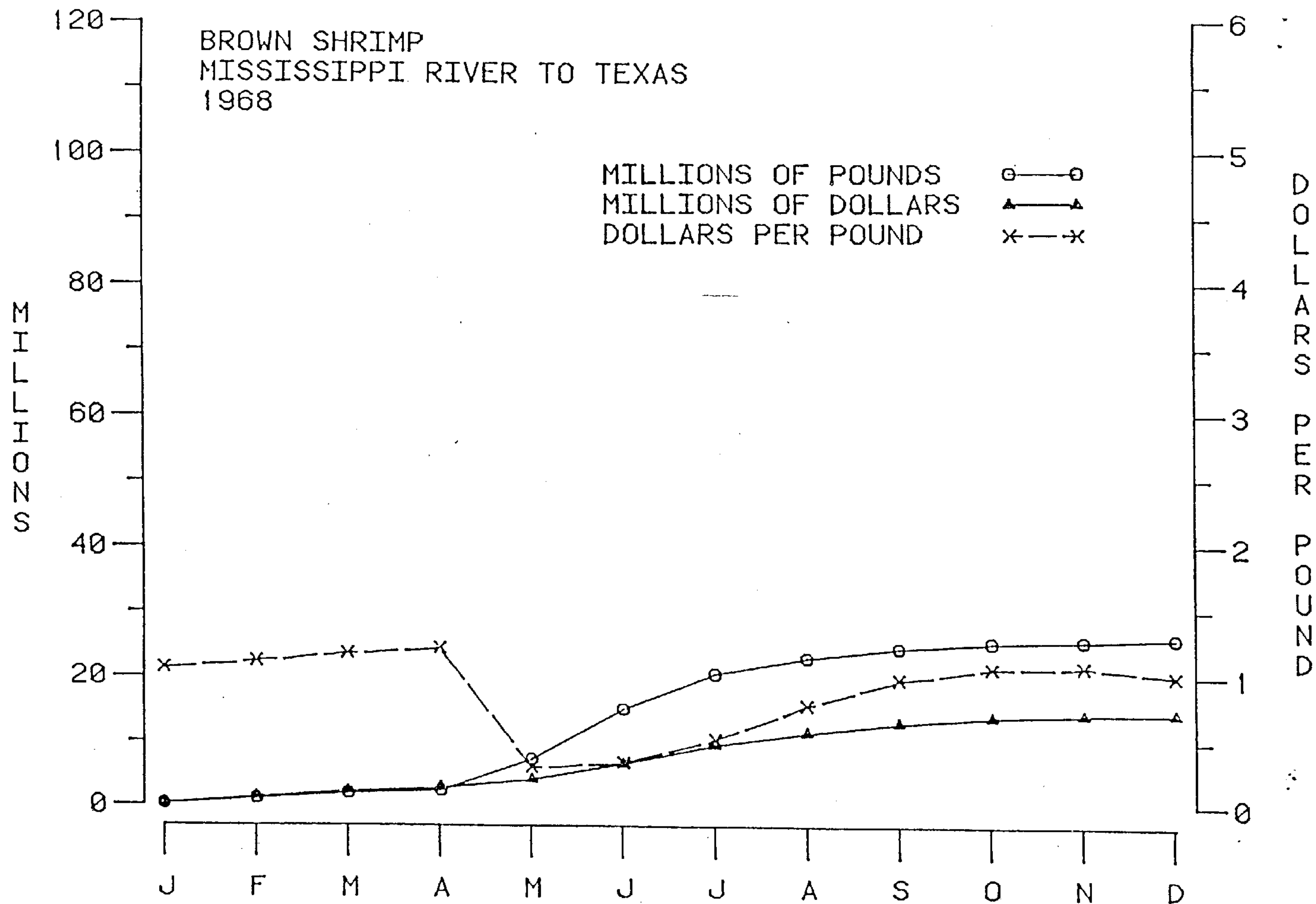


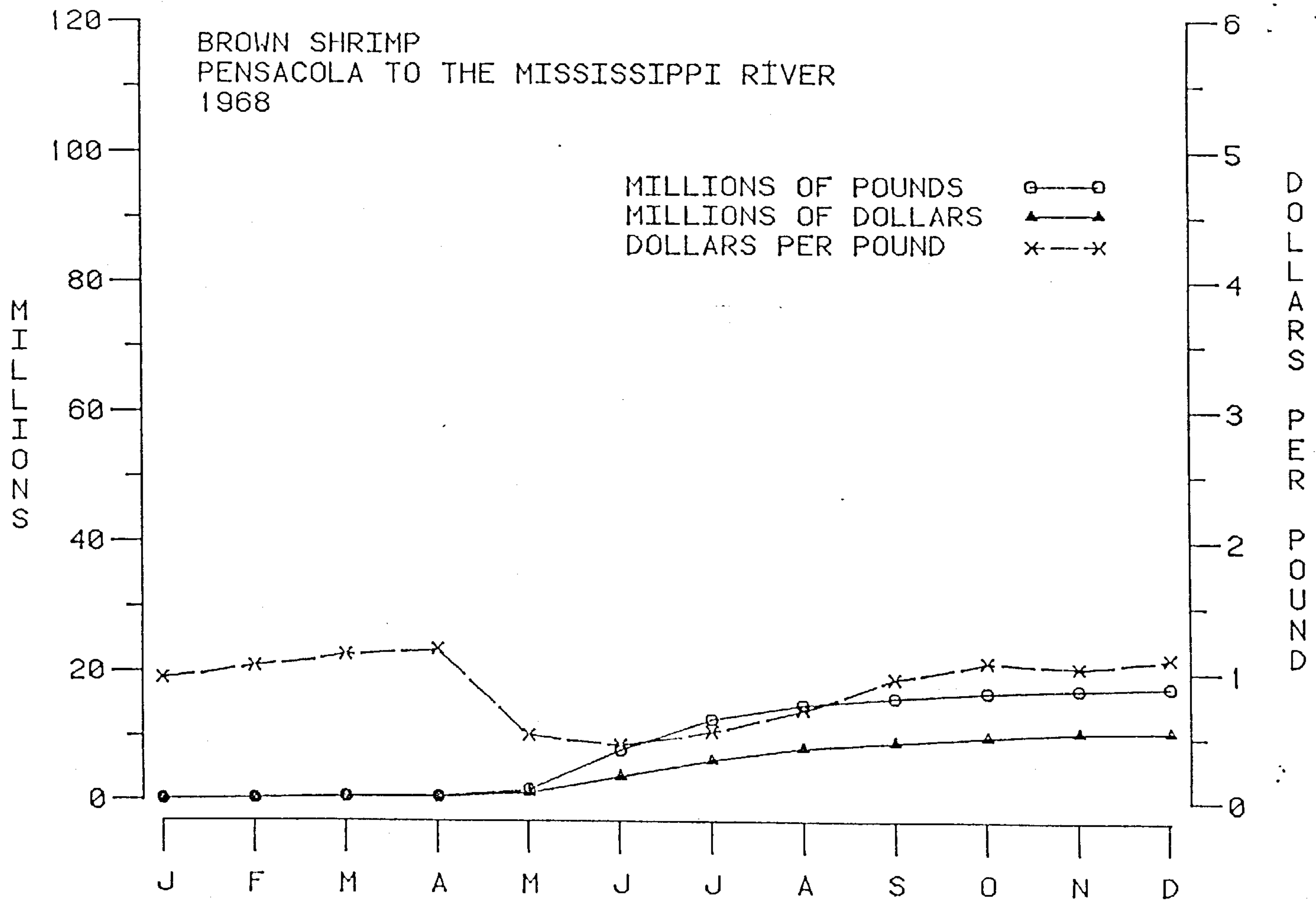
BROWN SHRIMP  
PENSACOLA TO THE MISSISSIPPI RIVER  
1967



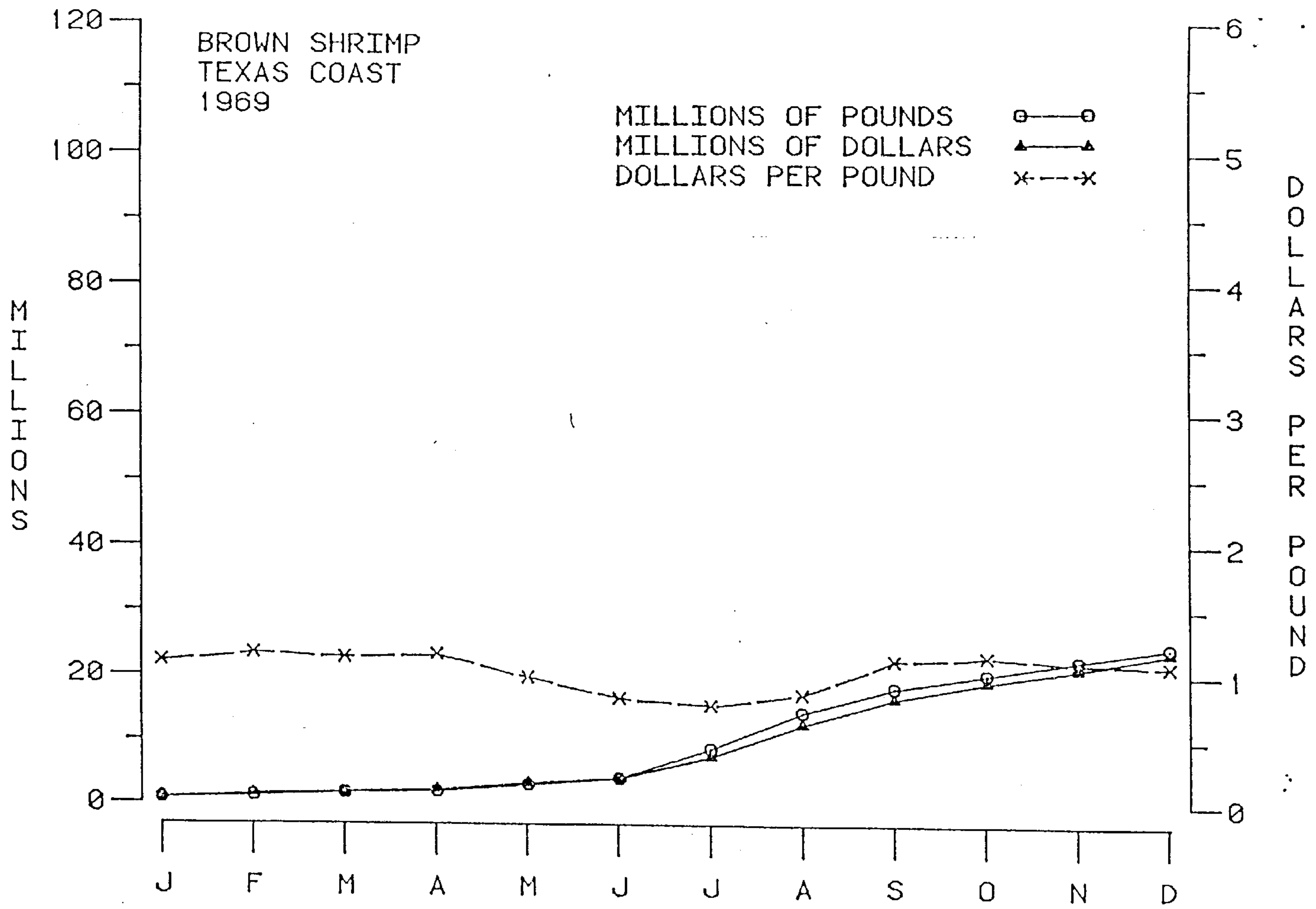


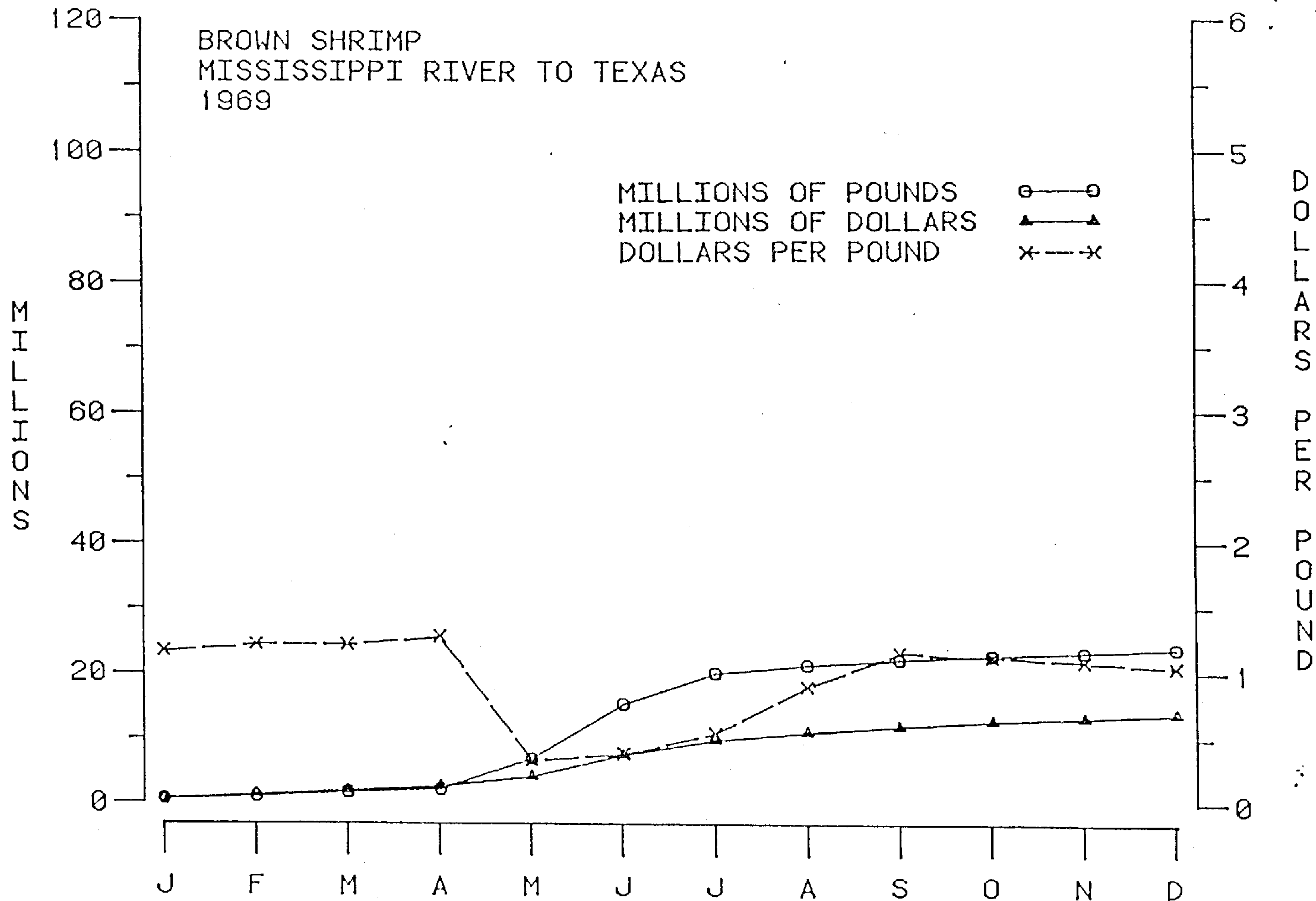
BROWN SHRIMP  
MISSISSIPPI RIVER TO TEXAS  
1968



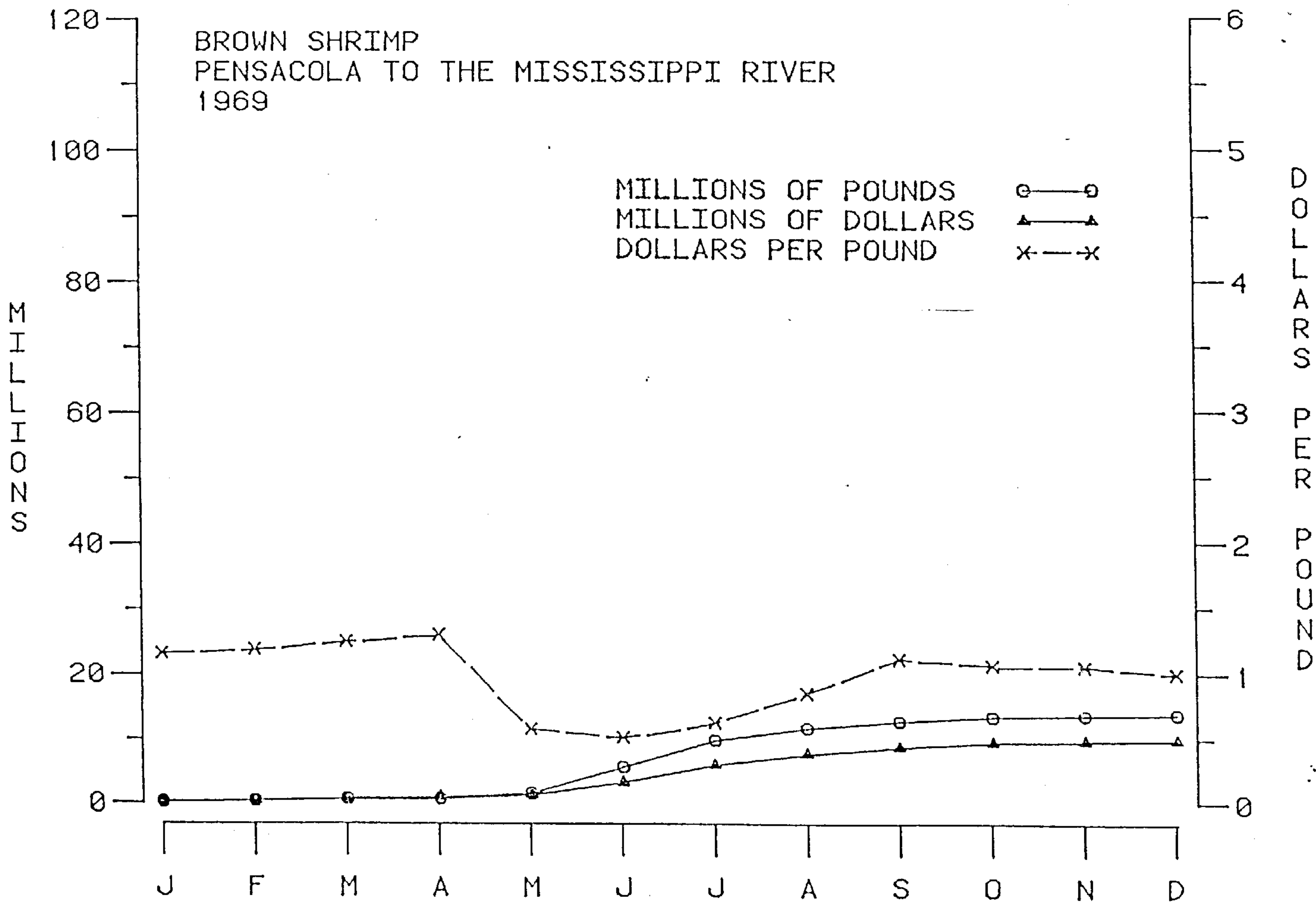


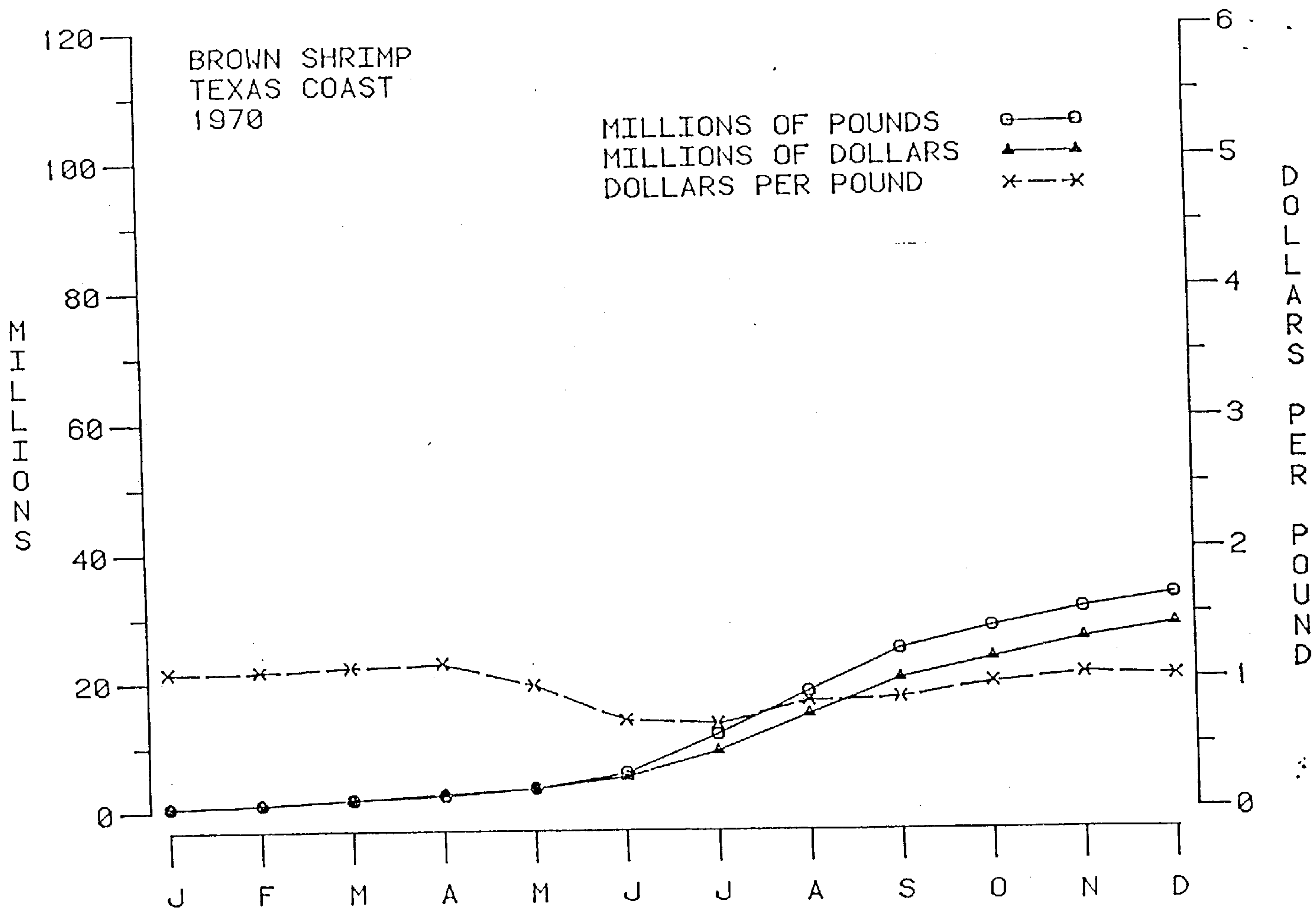






BROWN SHRIMP  
PENSACOLA TO THE MISSISSIPPI RIVER  
1969





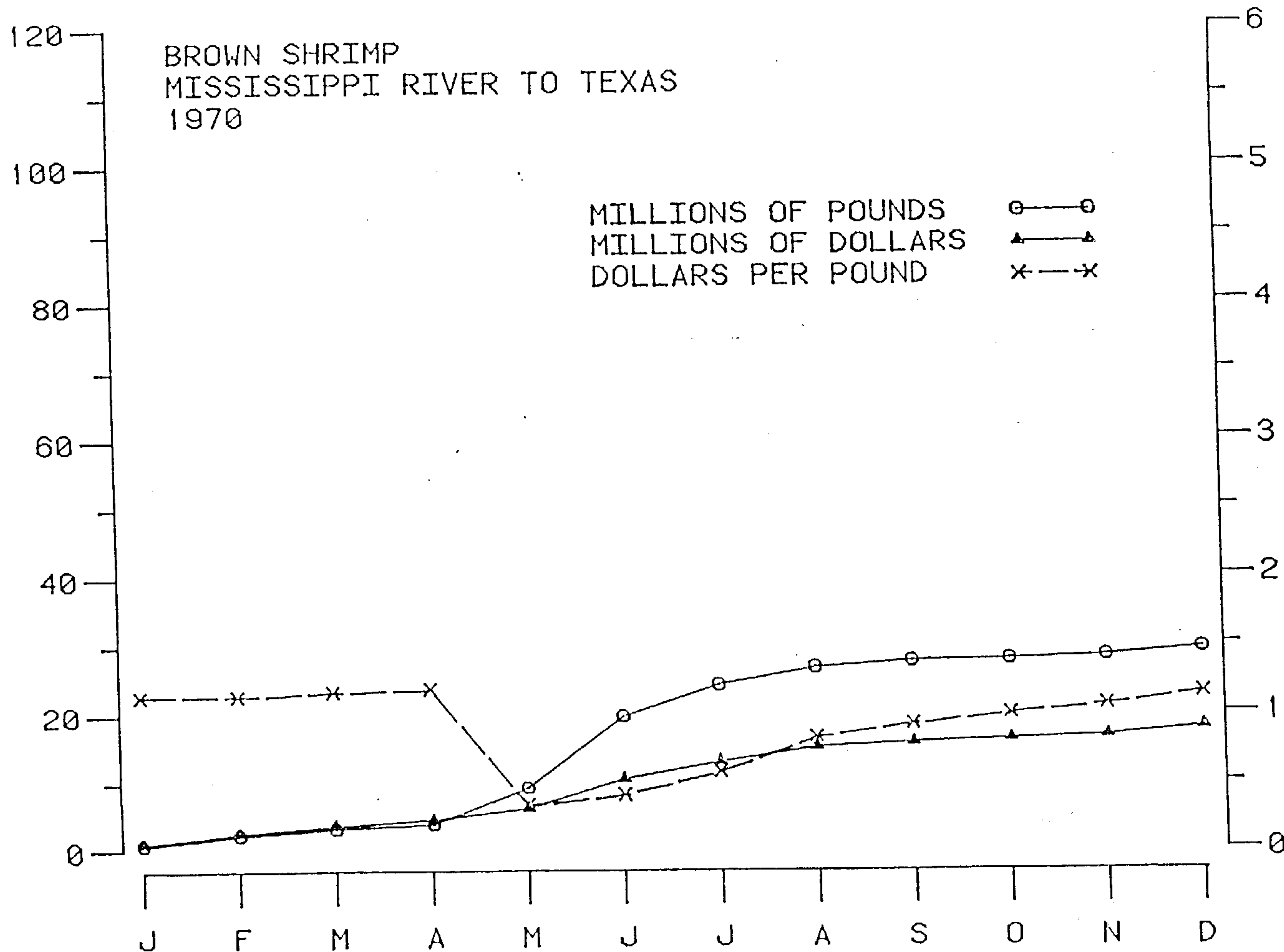
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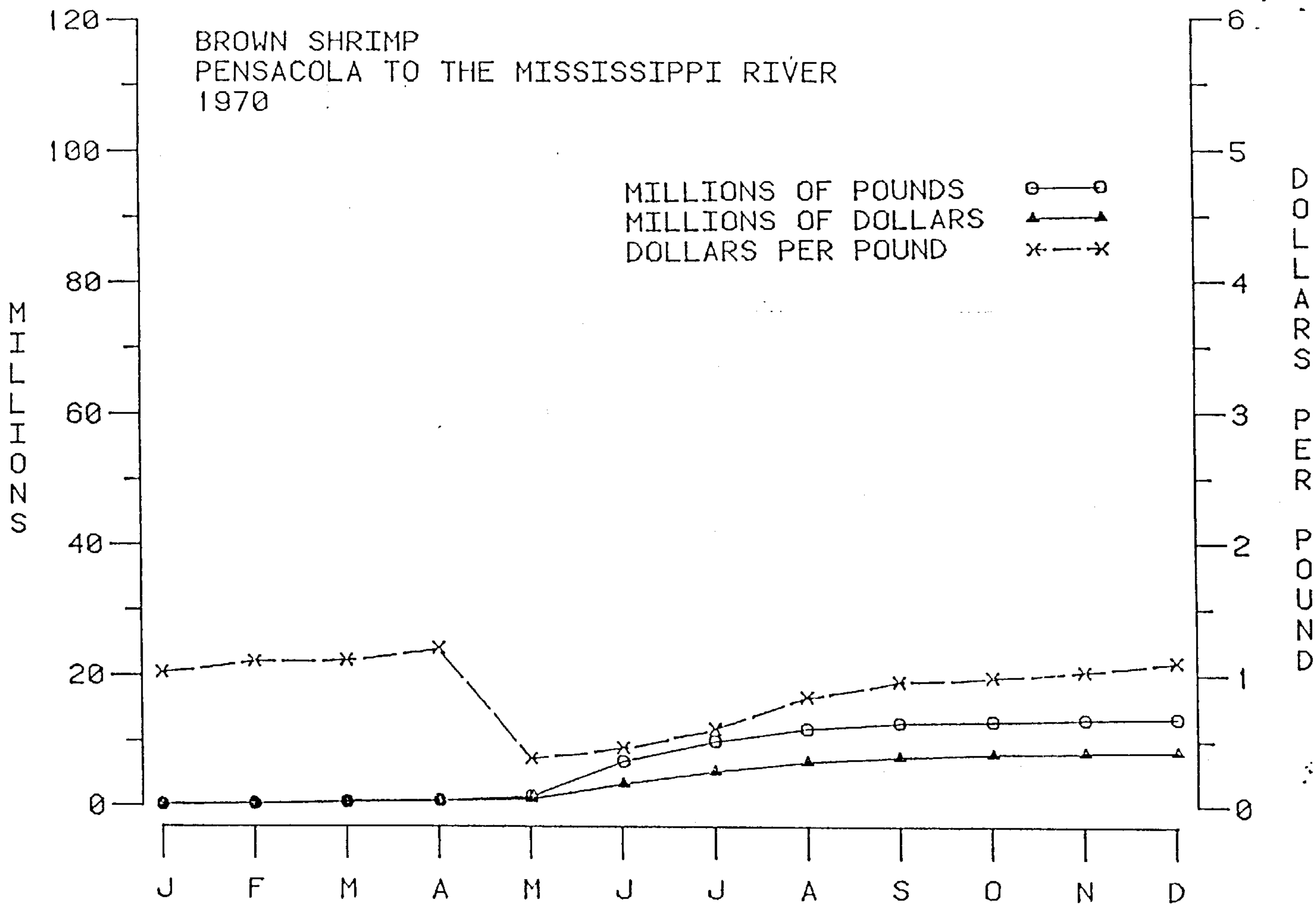
MILLIONS

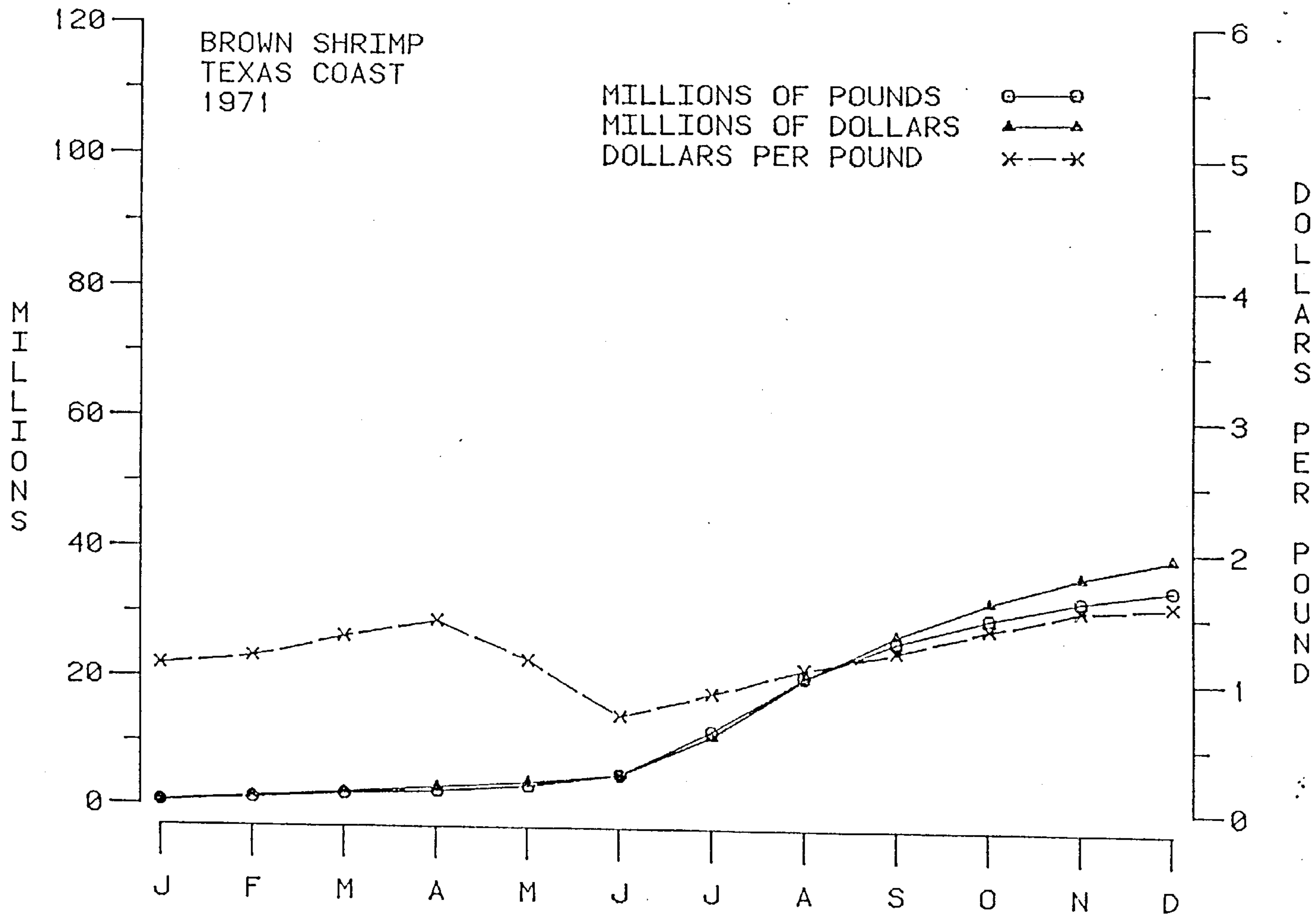
MILLIONS OF POUNDS  
MILLIONS OF DOLLARS  
DOLLARS PER POUND

○—○  
▲—▲  
×—×

DOLLARS PER POUND







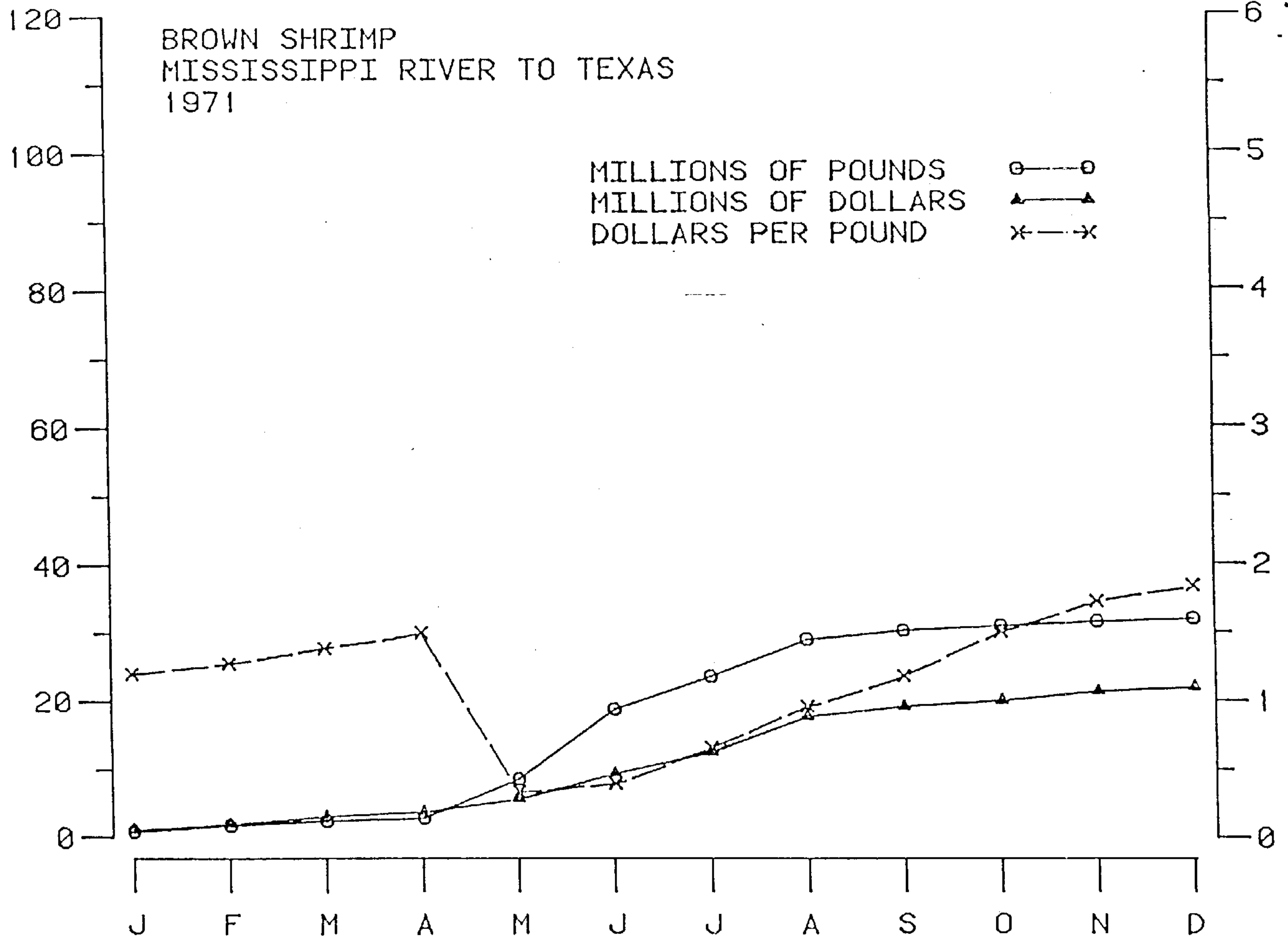
BROWN SHRIMP  
MISSISSIPPI RIVER TO TEXAS  
1971

MILLIONS OF POUNDS  
MILLIONS OF DOLLARS  
DOLLARS PER POUND

○—○  
▲—▲  
x—x

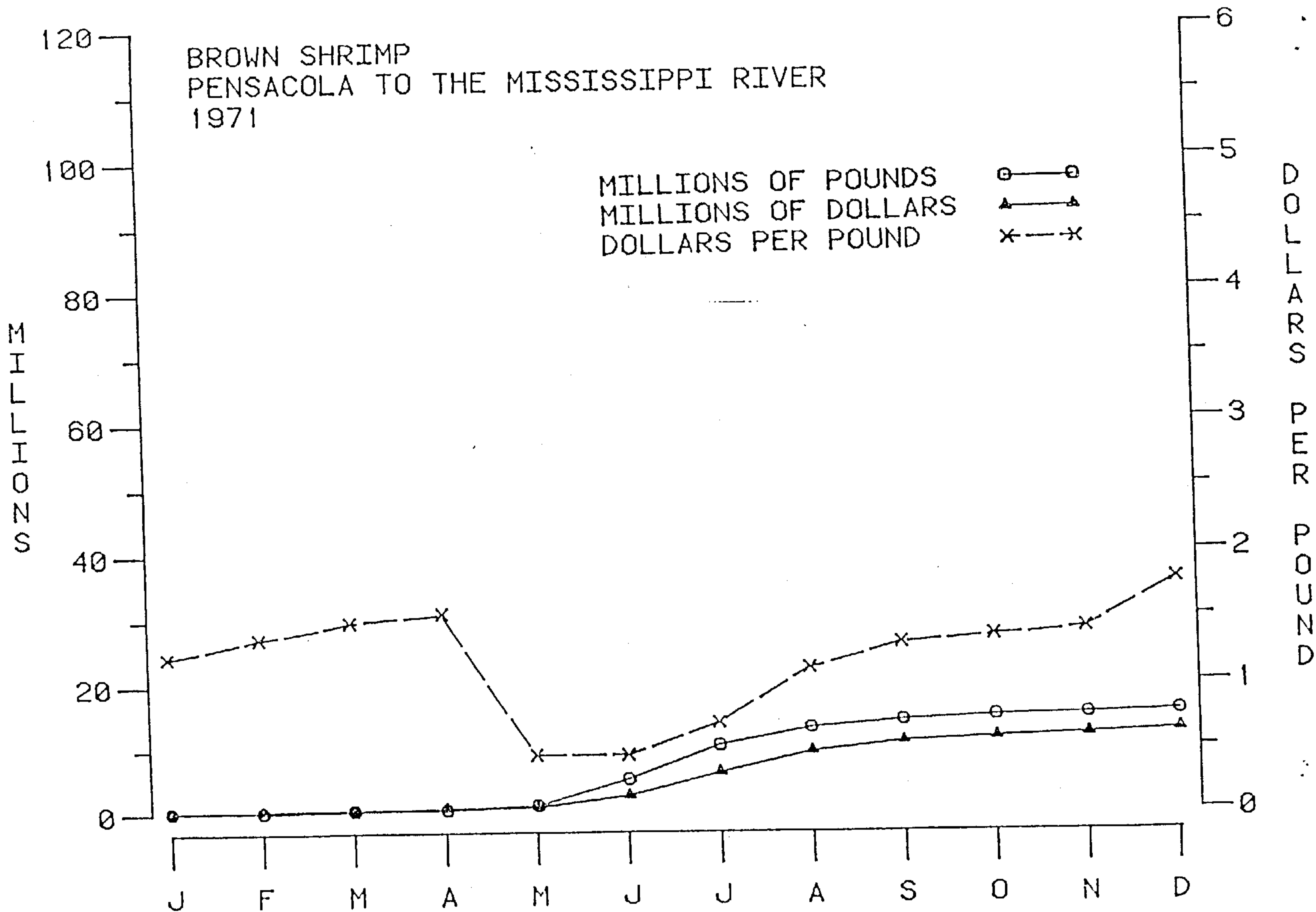
MILLIONS

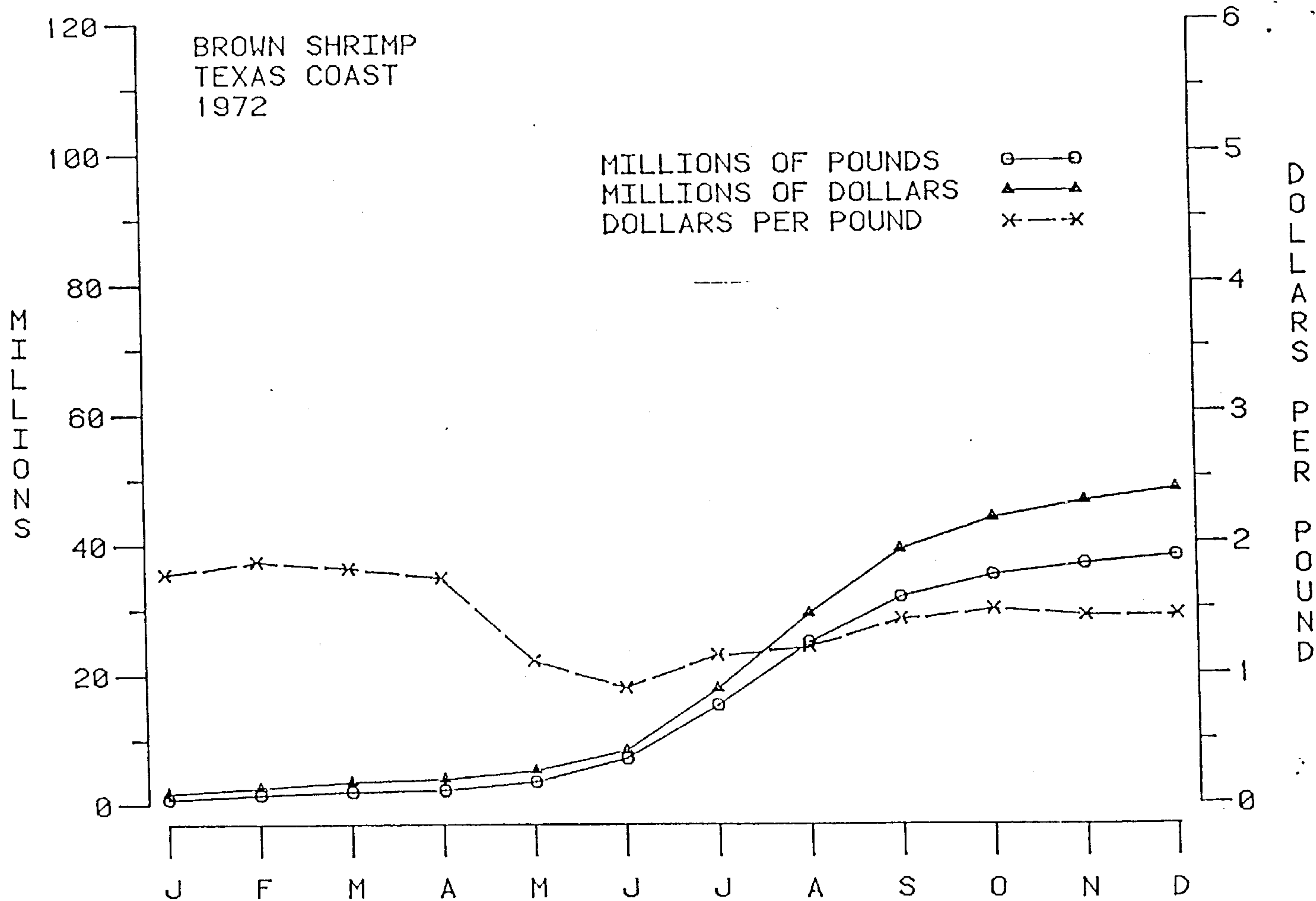
DOLLARS PER POUND





BROWN SHRIMP  
PENSACOLA TO THE MISSISSIPPI RIVER  
1971





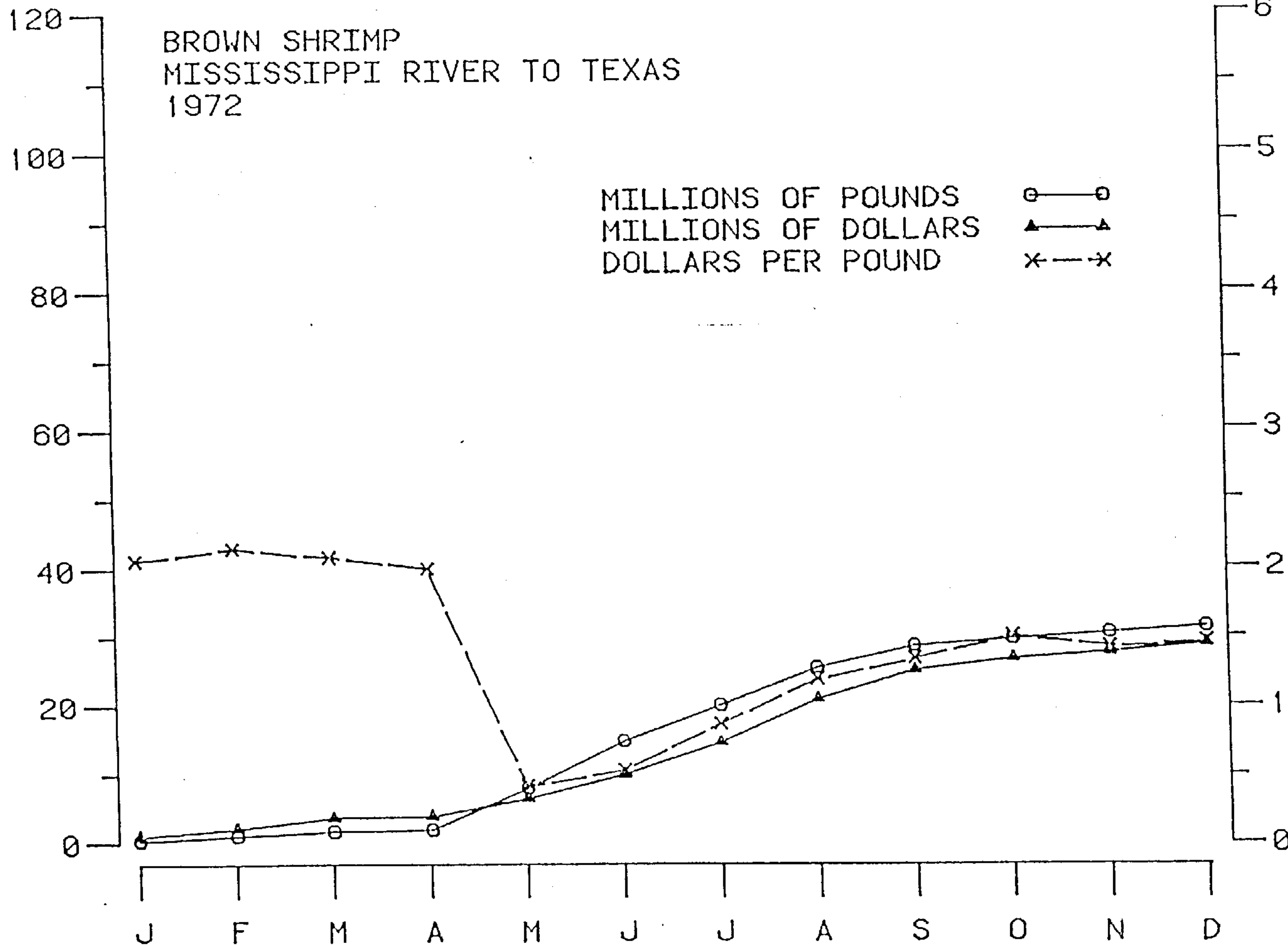
BROWN SHRIMP  
MISSISSIPPI RIVER TO TEXAS  
1972

MILLIONS

MILLIONS OF POUNDS  
MILLIONS OF DOLLARS  
DOLLARS PER POUND

○—○  
▲—▲  
x—x

DOLLARS PER POUND



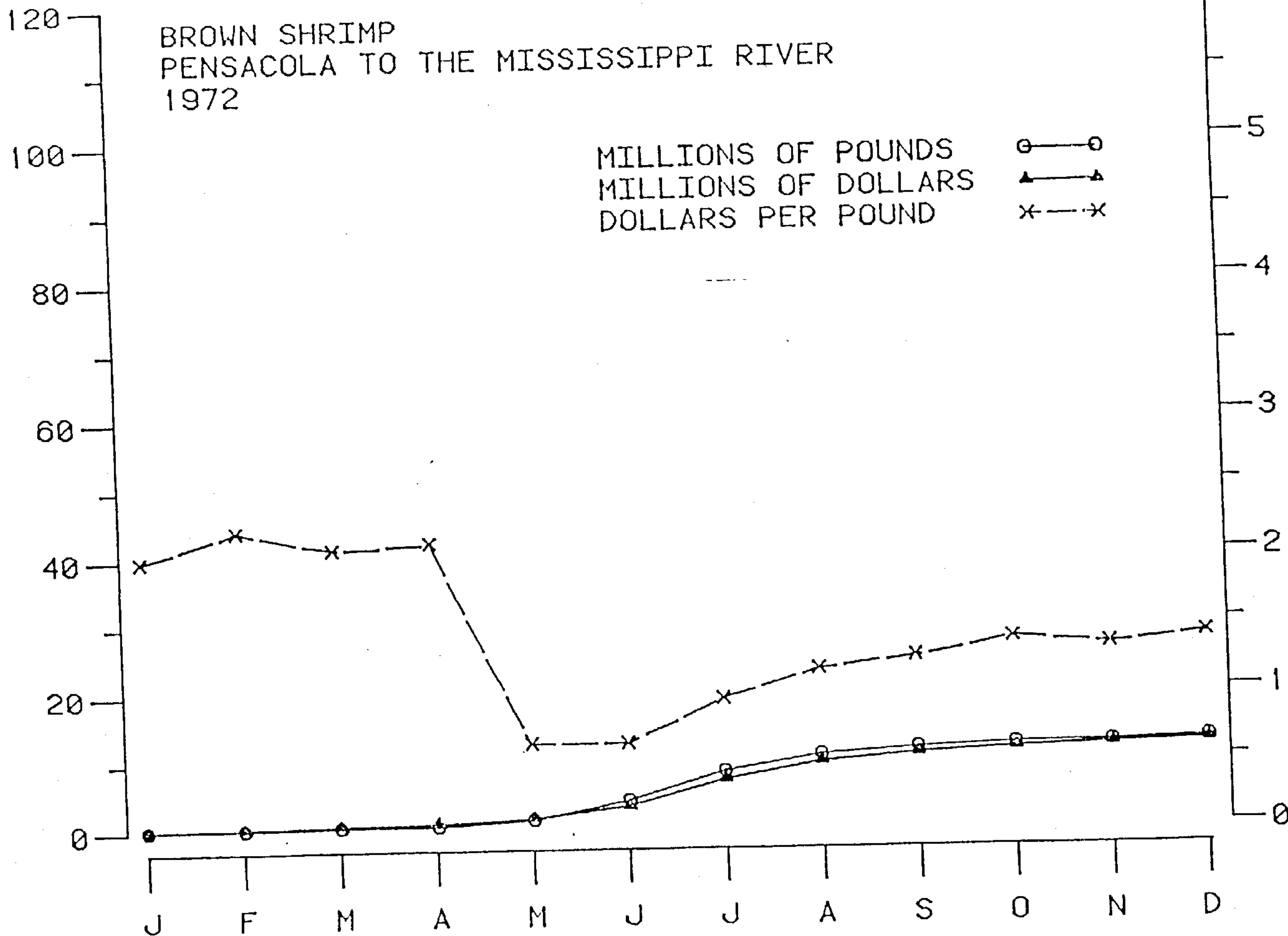
# BROWN SHRIMP PENSACOLA TO THE MISSISSIPPI RIVER 1972

MILLIONS

MILLIONS OF POUNDS  
MILLIONS OF DOLLARS  
DOLLARS PER POUND

○—○  
▲—▲  
×—×

DOLLARS  
PER  
POUND



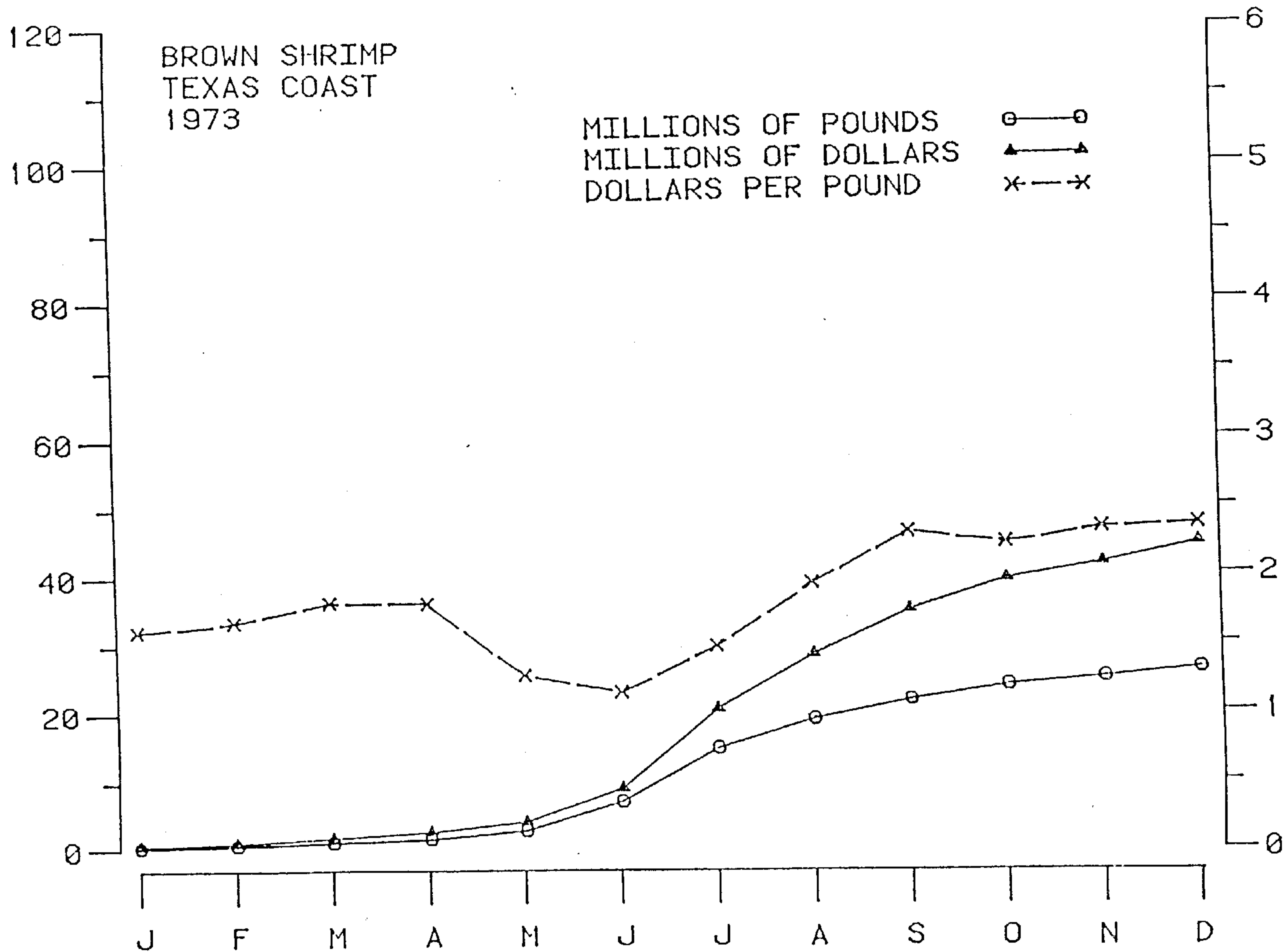
BROWN SHRIMP  
TEXAS COAST  
1973

MILLIONS OF POUNDS  
MILLIONS OF DOLLARS  
DOLLARS PER POUND

○—○  
▲—▲  
×—×

MILLIONS

DOLLARS PER POUND



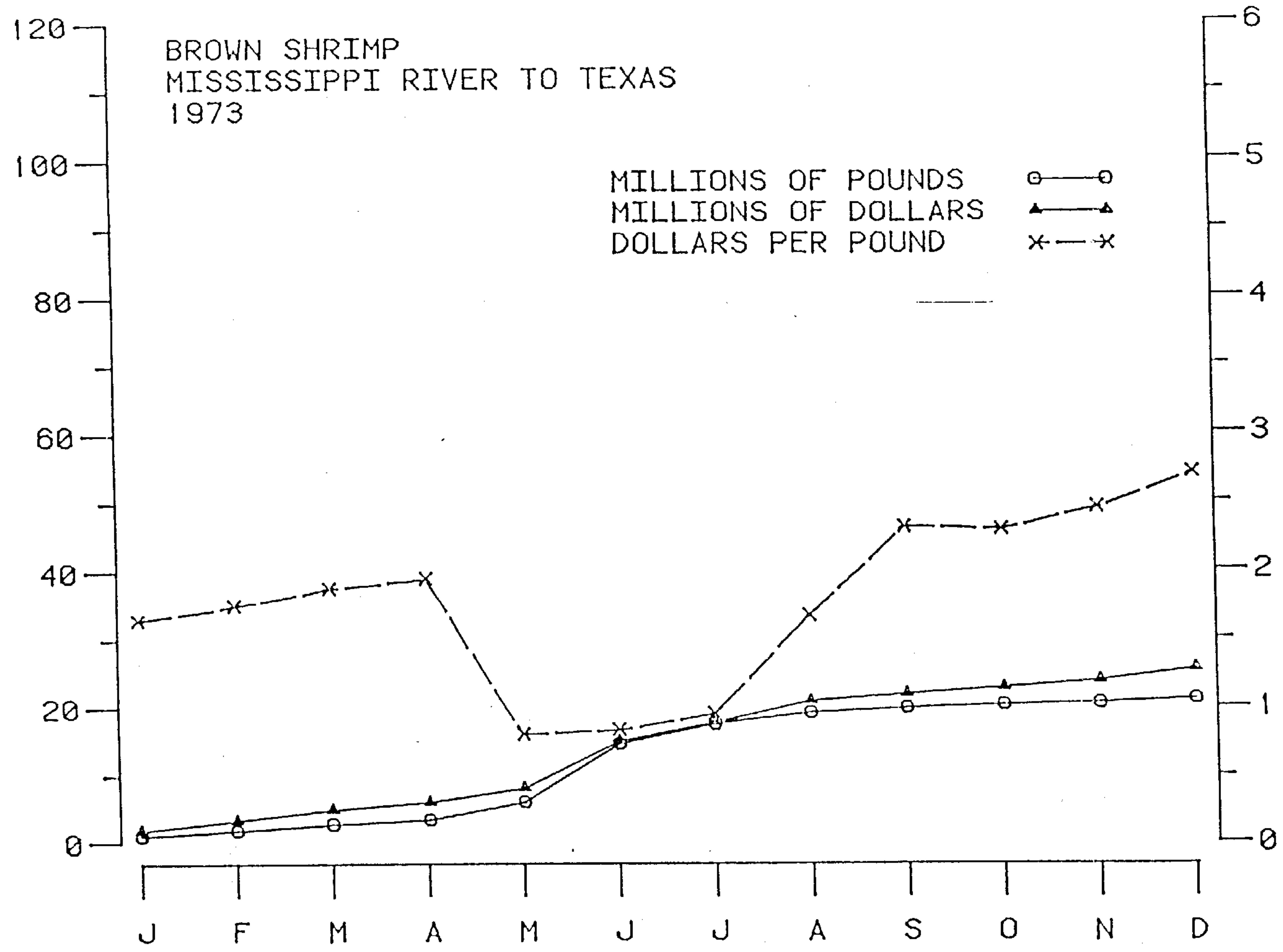
BROWN SHRIMP  
MISSISSIPPI RIVER TO TEXAS  
1973

MILLIONS

MILLIONS OF POUNDS  
MILLIONS OF DOLLARS  
DOLLARS PER POUND

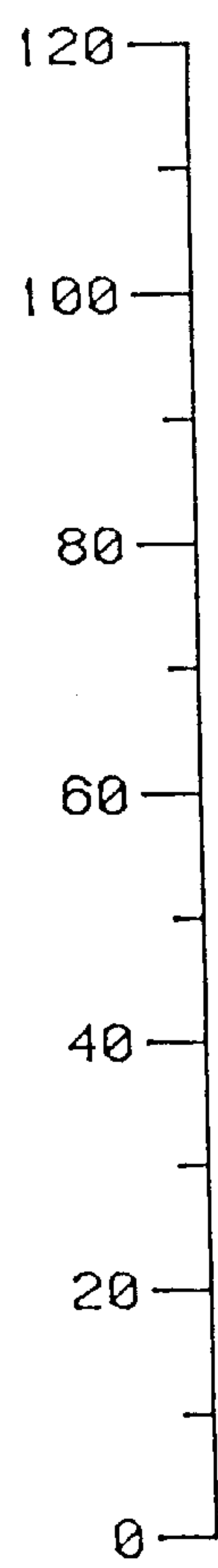
○—○  
▲—▲  
×—×

DOLLARS PER POUND



BROWN SHRIMP  
PENSACOLA TO THE MISSISSIPPI RIVER  
1973

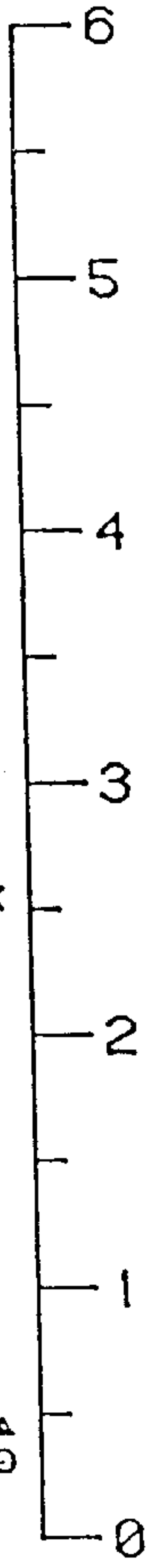
MILLIONS



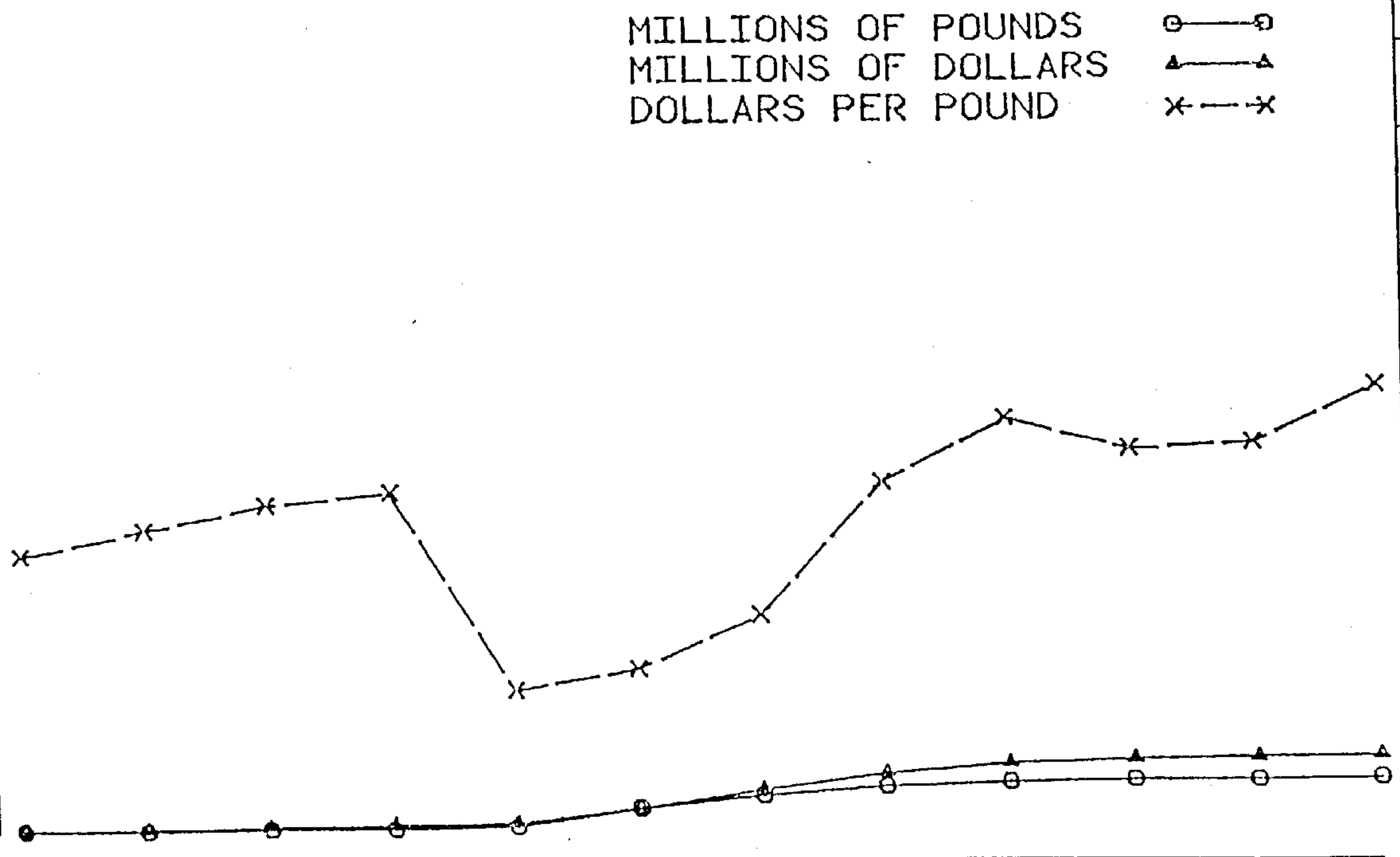
MILLIONS OF POUNDS  
MILLIONS OF DOLLARS  
DOLLARS PER POUND

○—○  
▲—▲  
x—x

DOLLARS  
PER  
POUND



J F M A M J J A S O N D



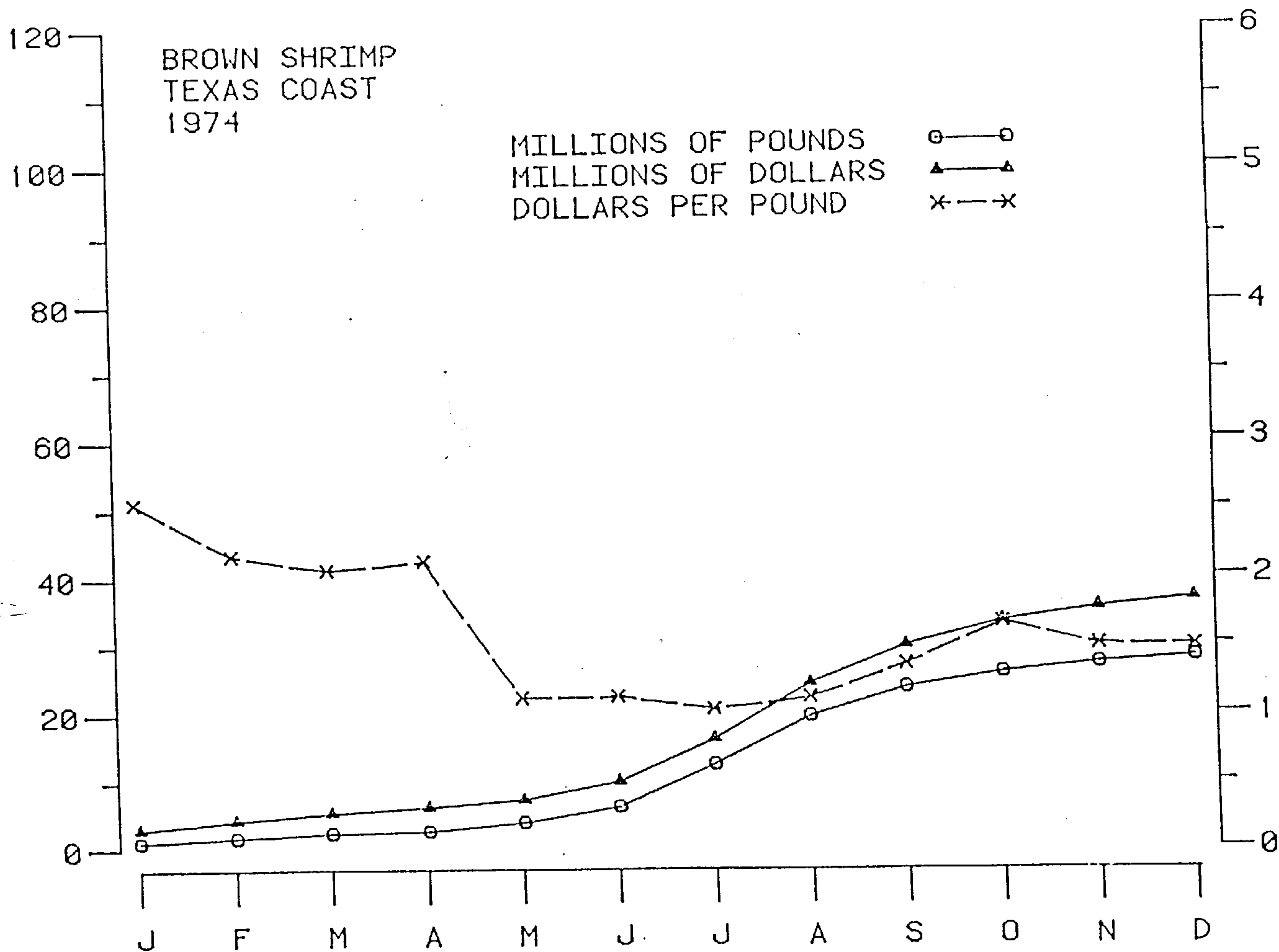
BROWN SHRIMP  
TEXAS COAST  
1974

MILLIONS OF POUNDS  
MILLIONS OF DOLLARS  
DOLLARS PER POUND

○—○  
▲—▲  
×—×

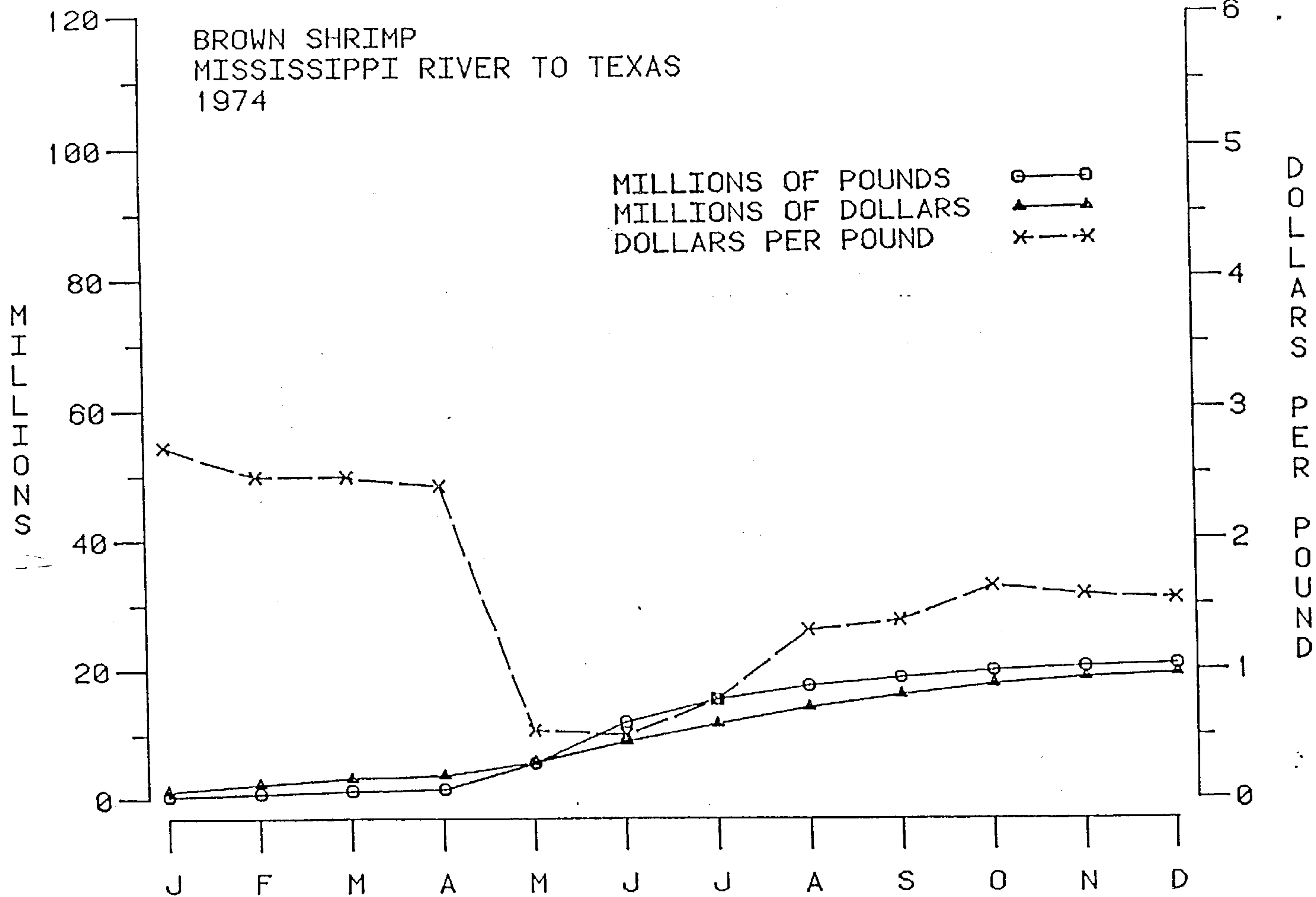
MILLIONS

DOLLARS PER POUND





BROWN SHRIMP  
MISSISSIPPI RIVER TO TEXAS  
1974



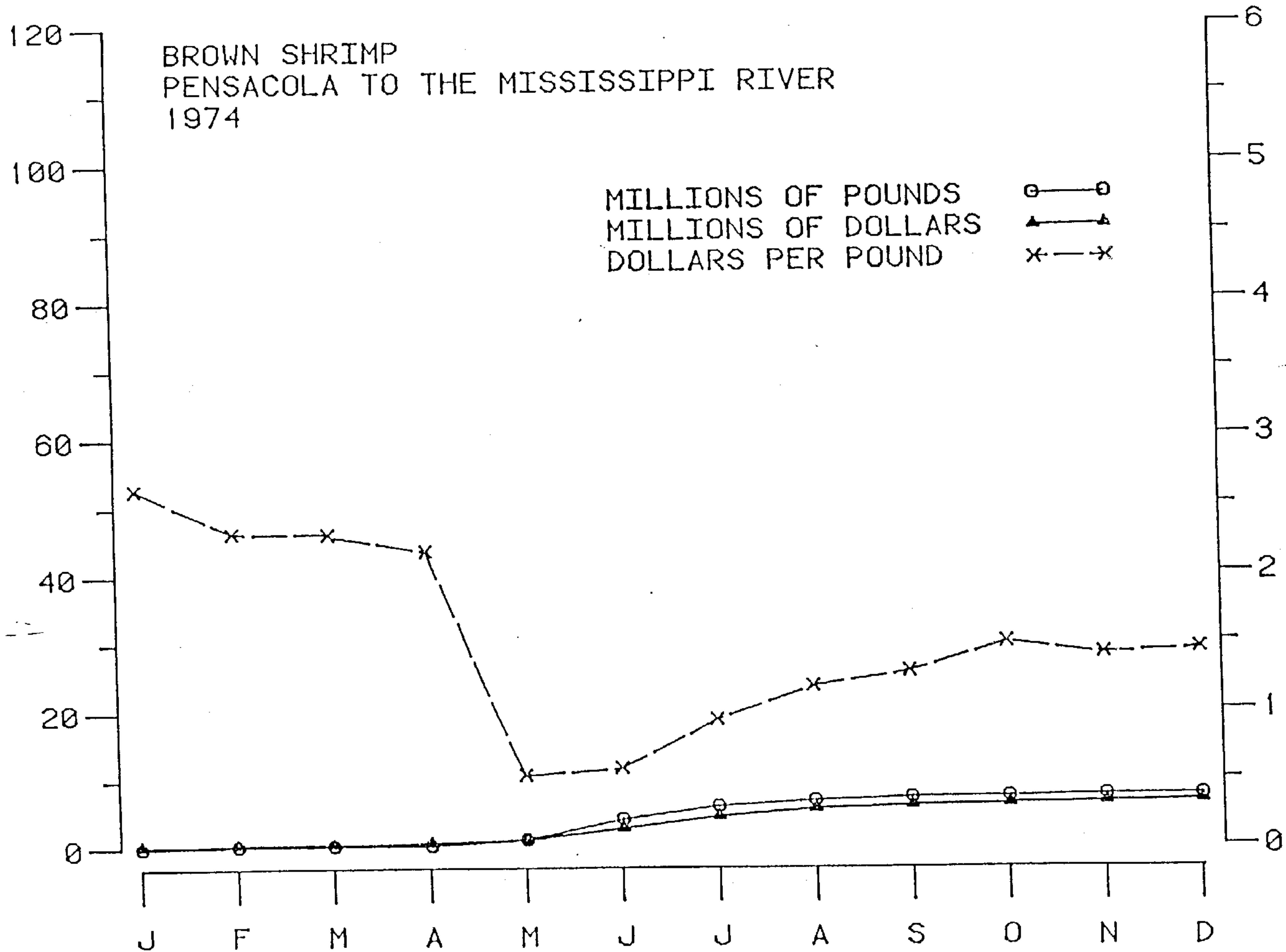
BROWN SHRIMP  
PENSACOLA TO THE MISSISSIPPI RIVER  
1974

MILLIONS OF POUNDS  
MILLIONS OF DOLLARS  
DOLLARS PER POUND

○—○  
▲—▲  
x—x

MILLIONS

DOLLARS PER POUND



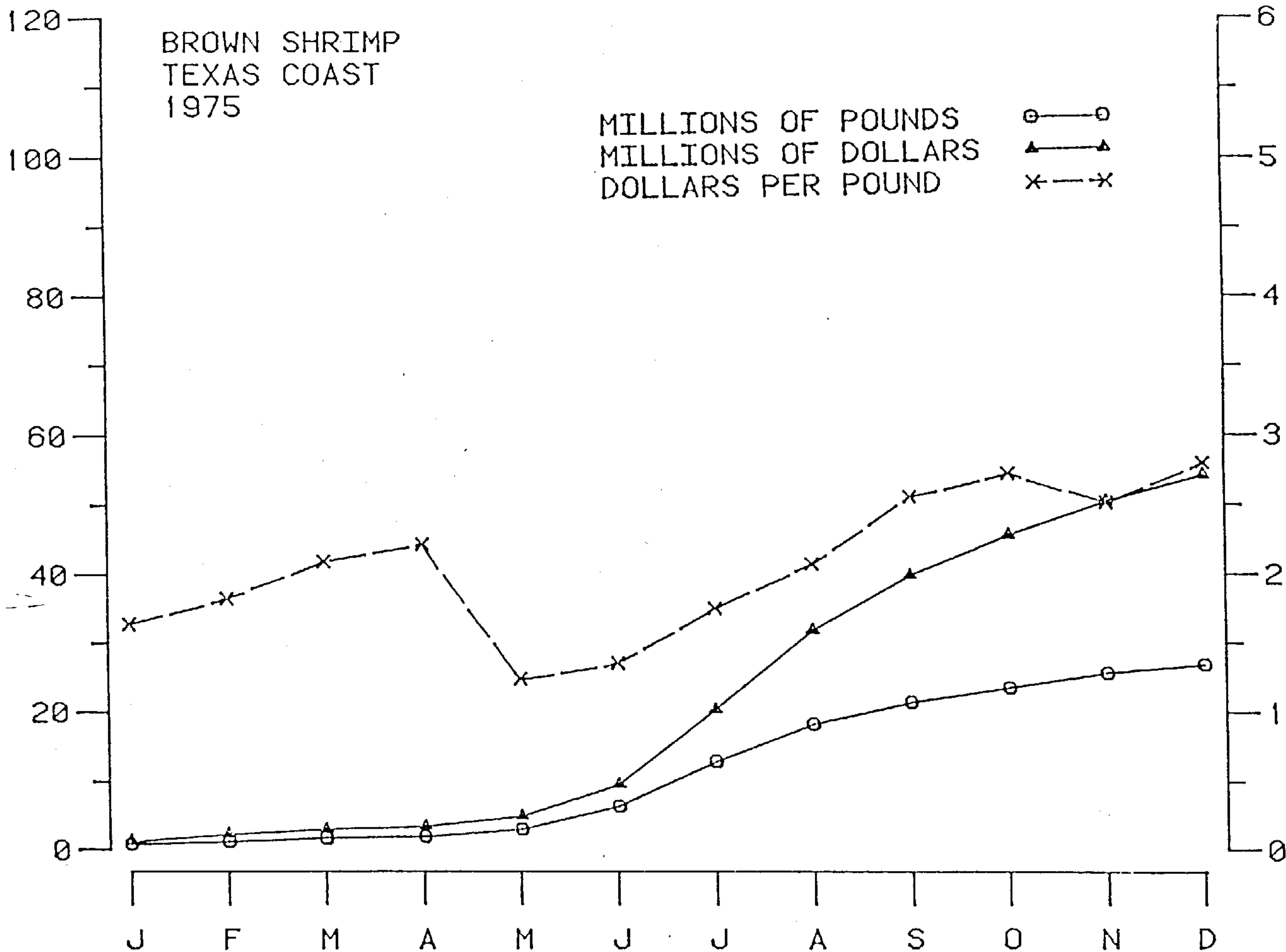
BROWN SHRIMP  
TEXAS COAST  
1975

MILLIONS OF POUNDS  
MILLIONS OF DOLLARS  
DOLLARS PER POUND

○—○  
▲—▲  
×—×

MILLIONS

DOLLARS PER POUND



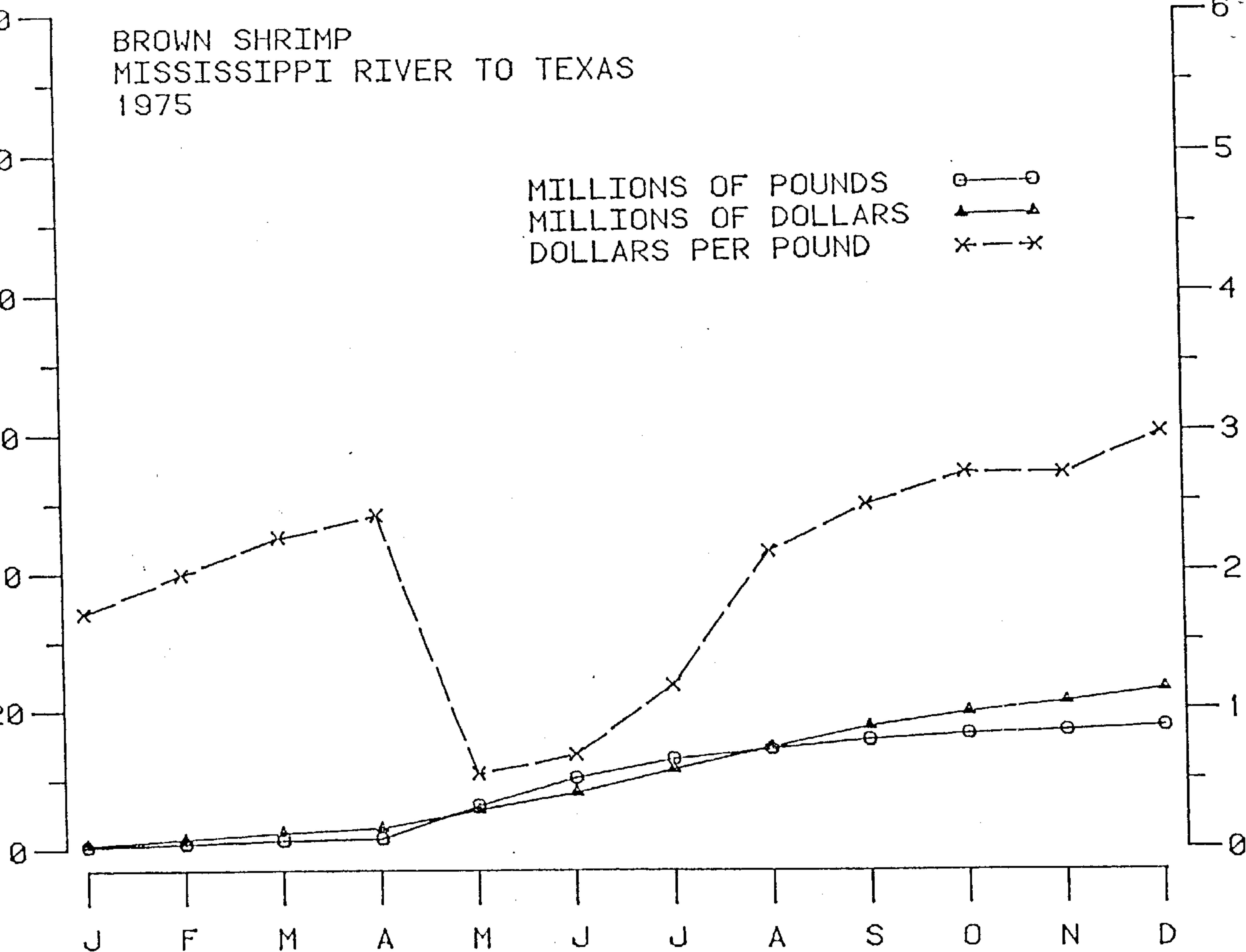
BROWN SHRIMP  
MISSISSIPPI RIVER TO TEXAS  
1975

MILLIONS

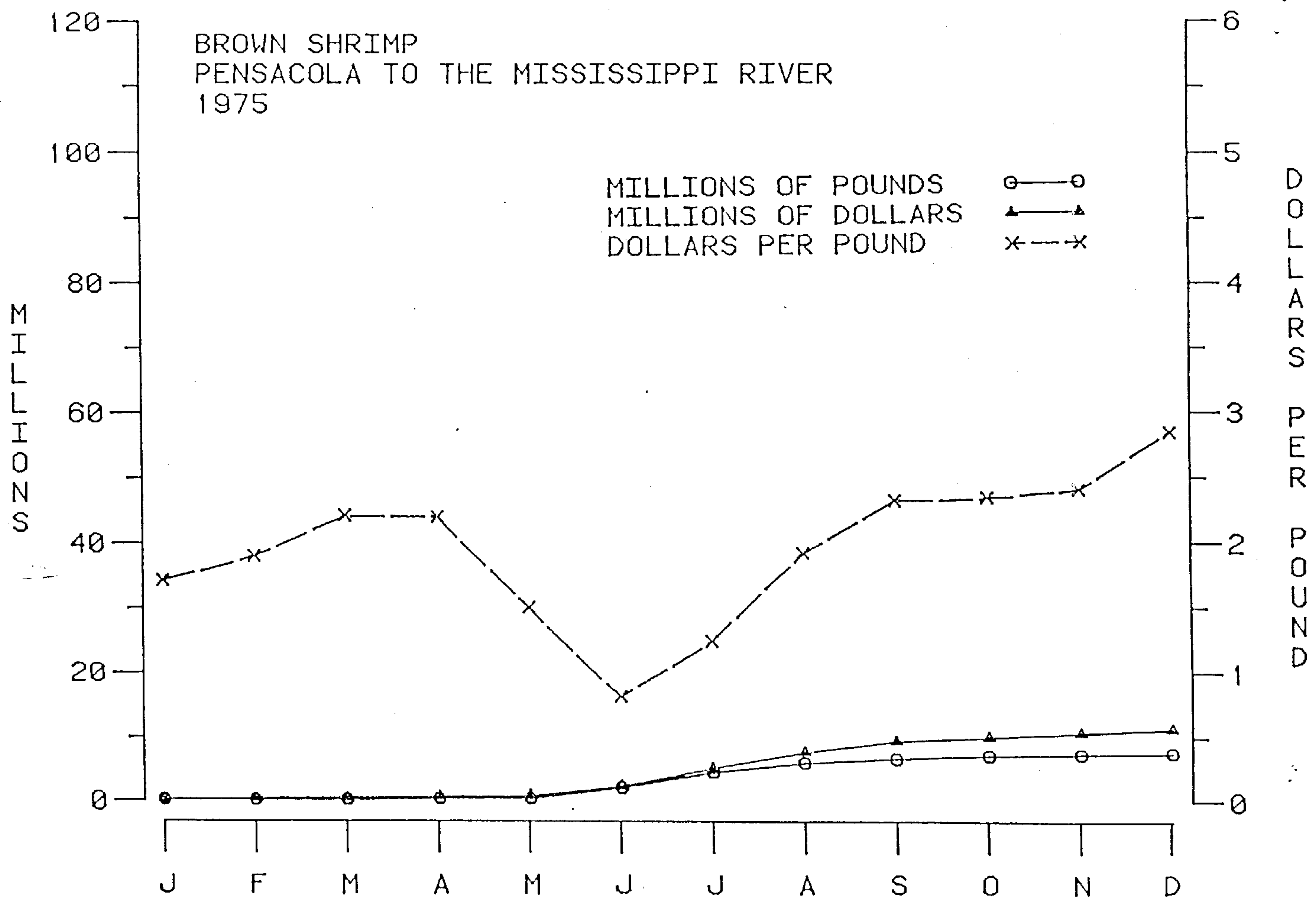
MILLIONS OF POUNDS  
MILLIONS OF DOLLARS  
DOLLARS PER POUND

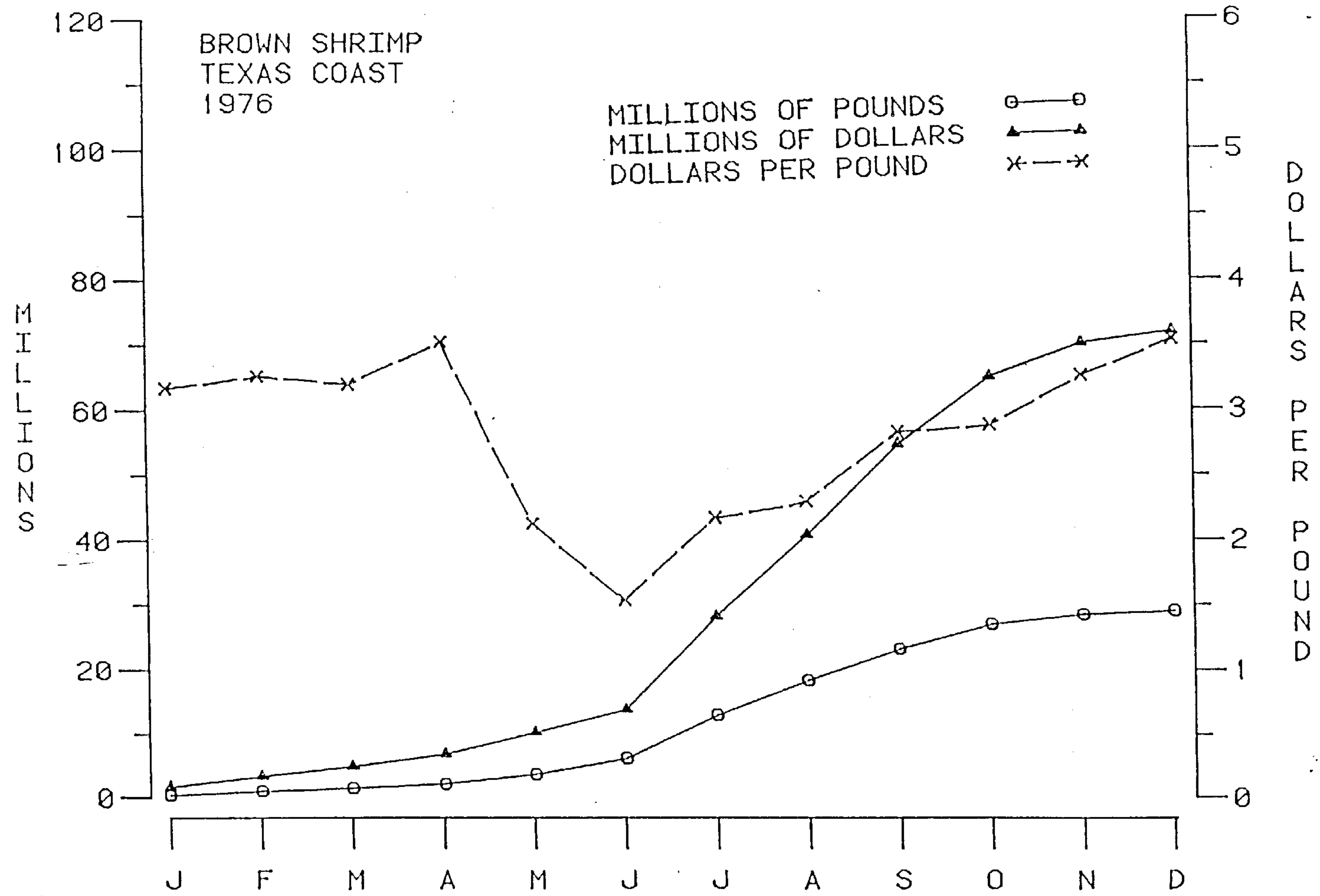
○—○  
▲—▲  
×—×

DOLLARS PER POUND

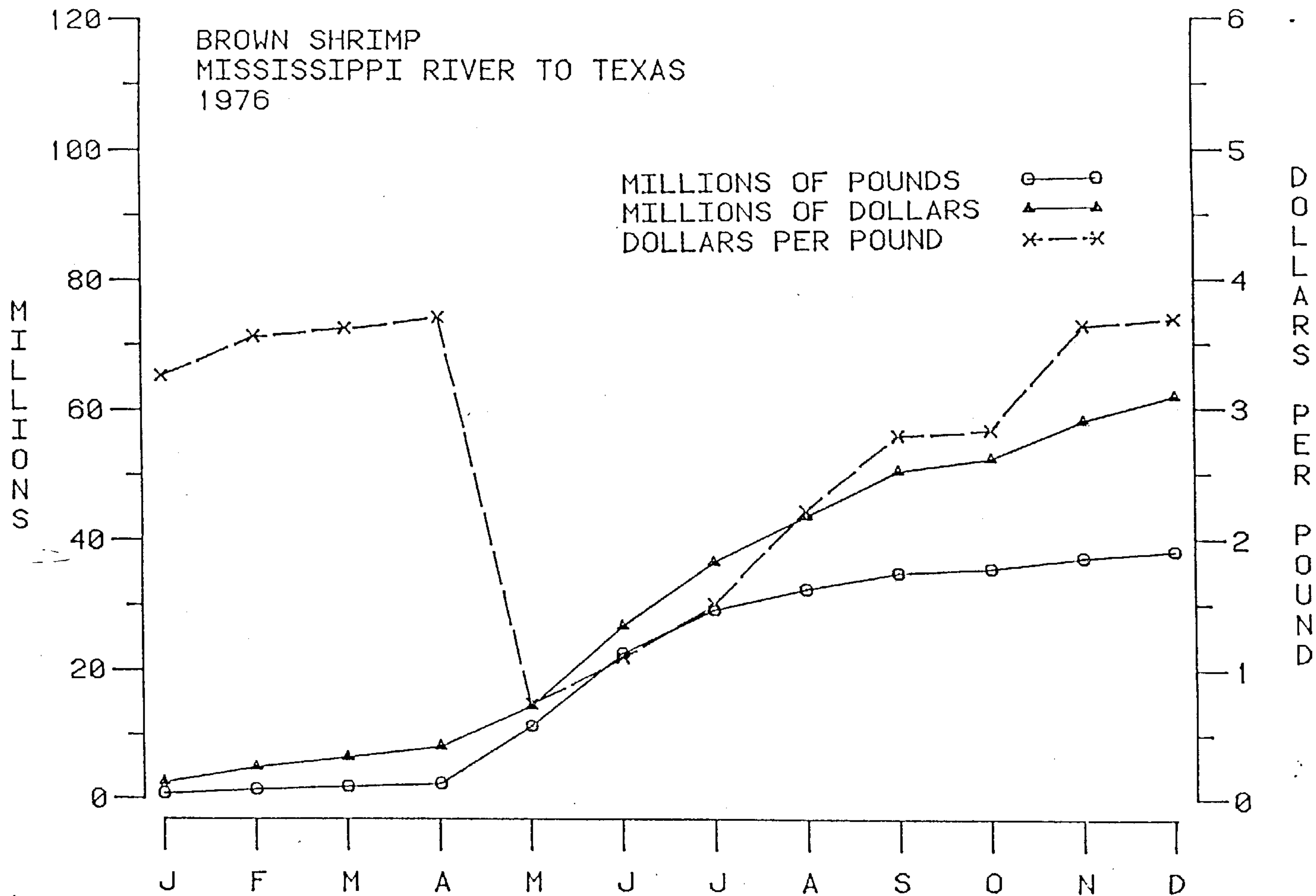


# BROWN SHRIMP PENSACOLA TO THE MISSISSIPPI RIVER 1975

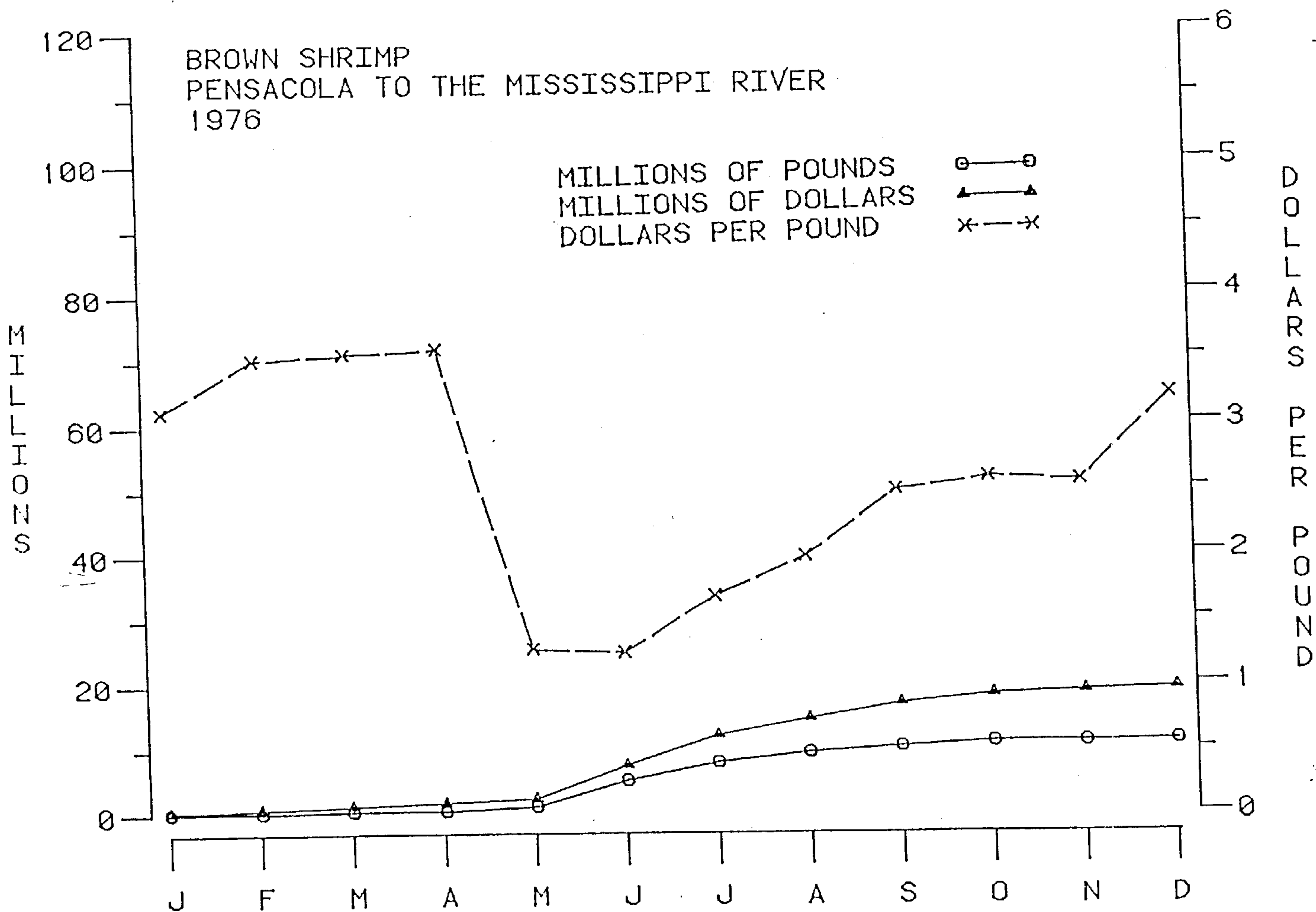




BROWN SHRIMP  
MISSISSIPPI RIVER TO TEXAS  
1976

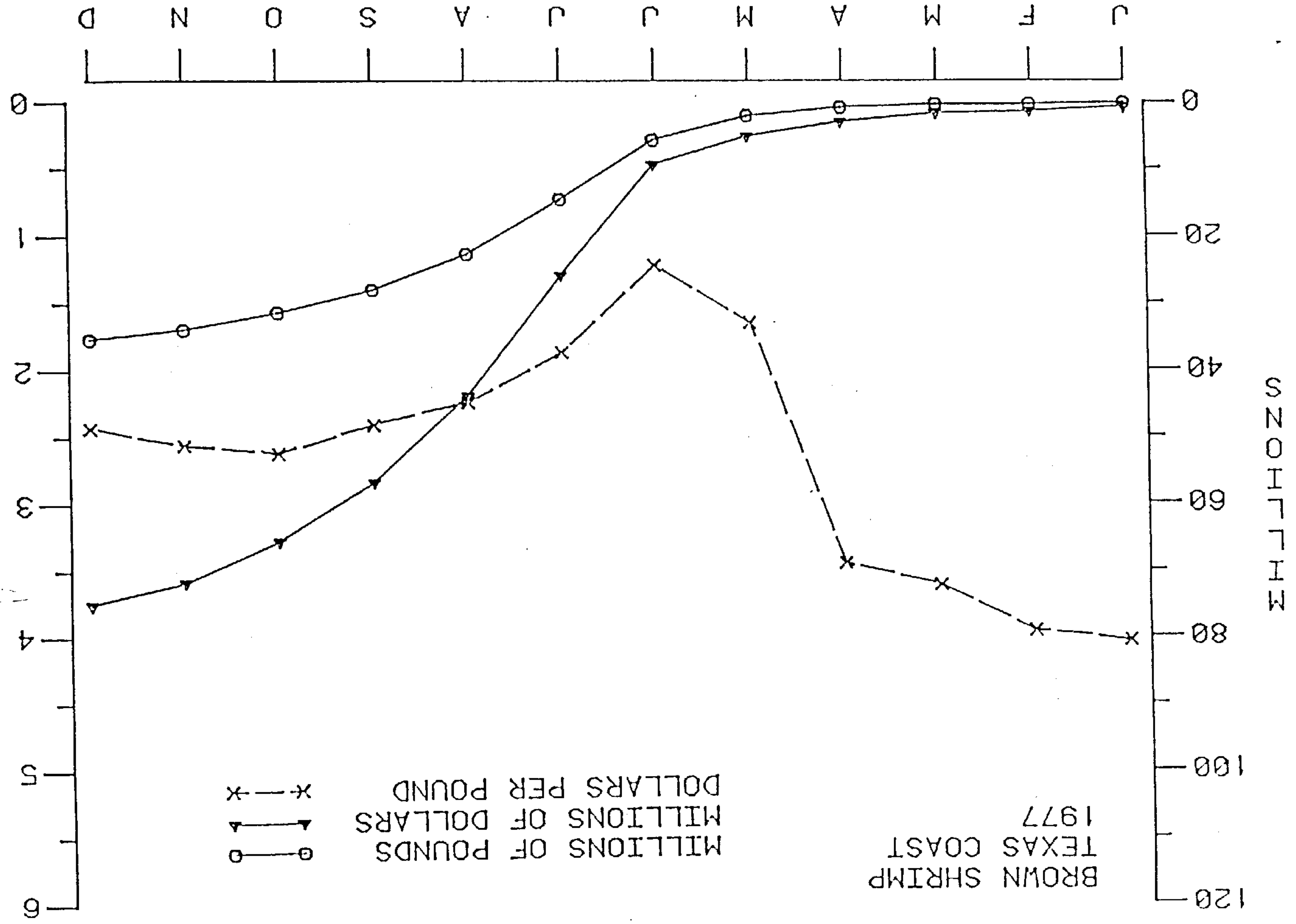


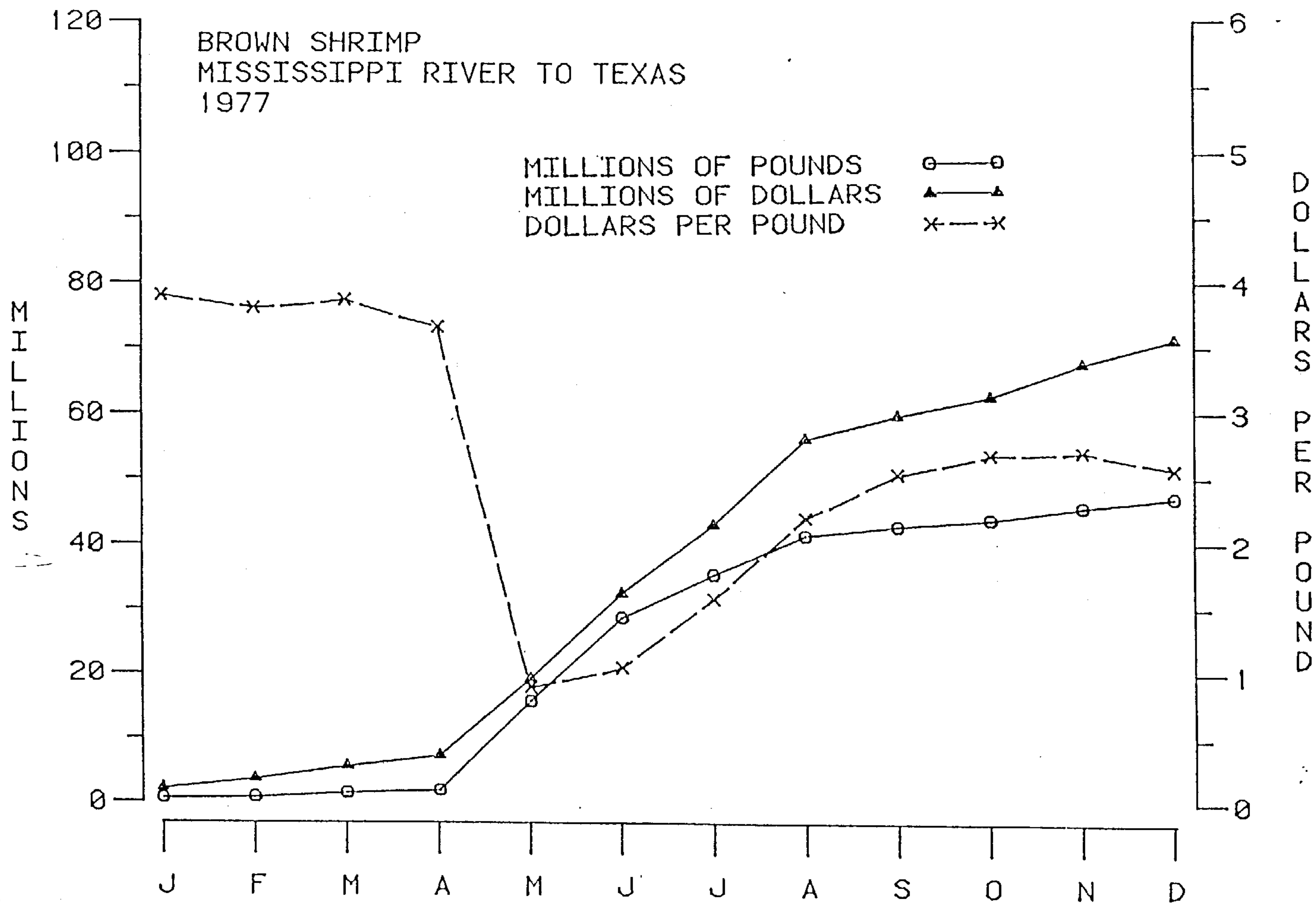
BROWN SHRIMP  
PENSACOLA TO THE MISSISSIPPI RIVER  
1976

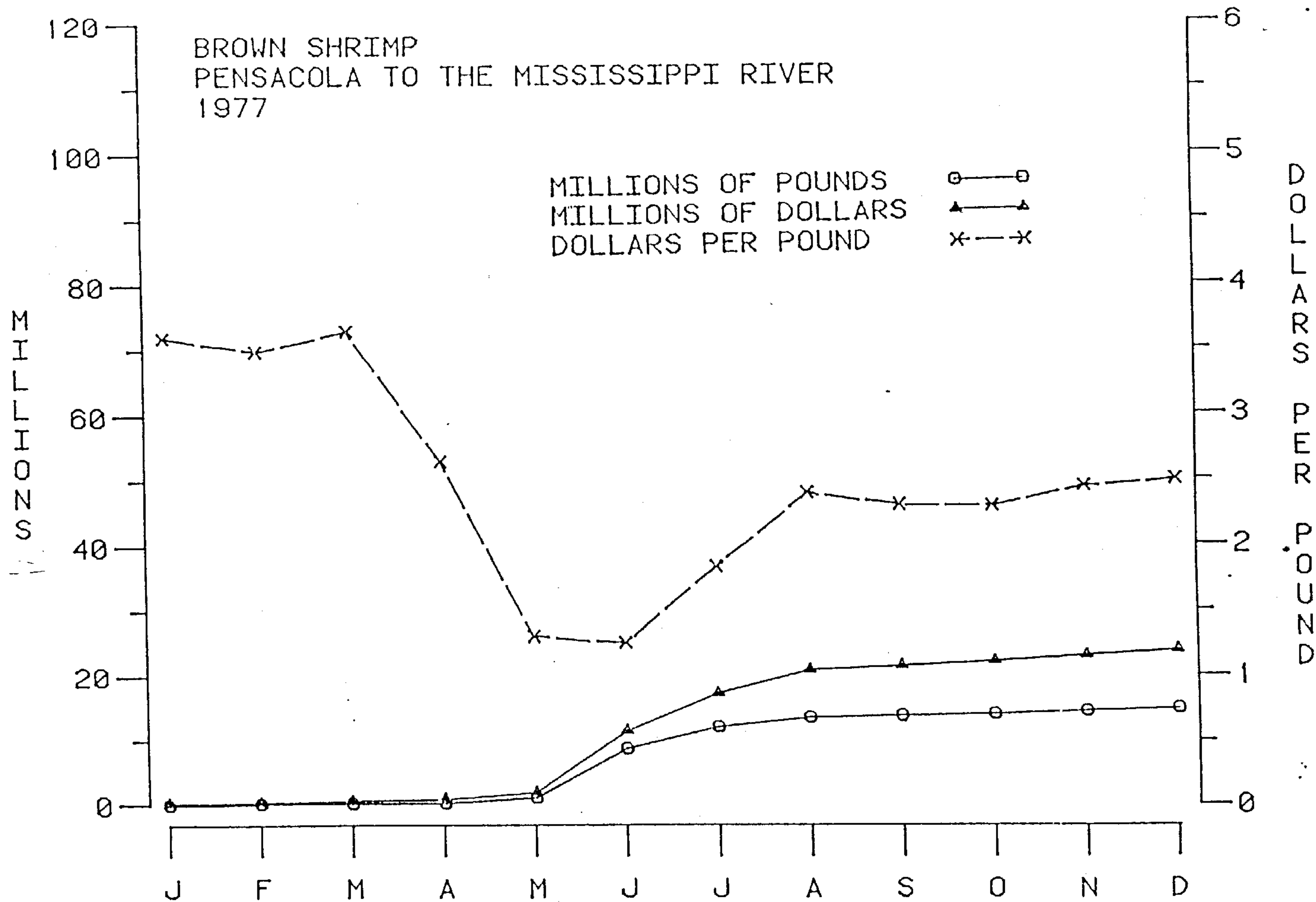


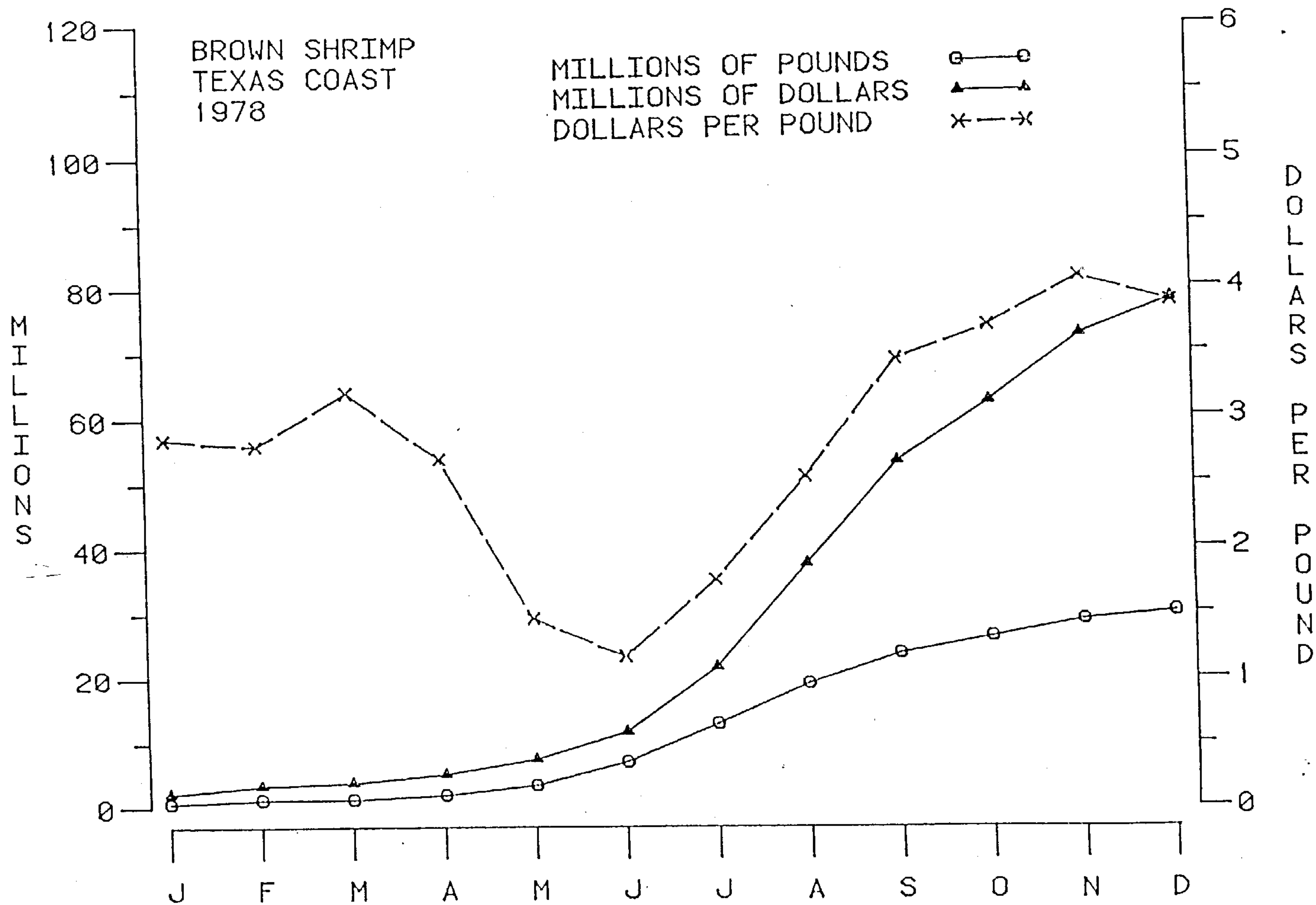


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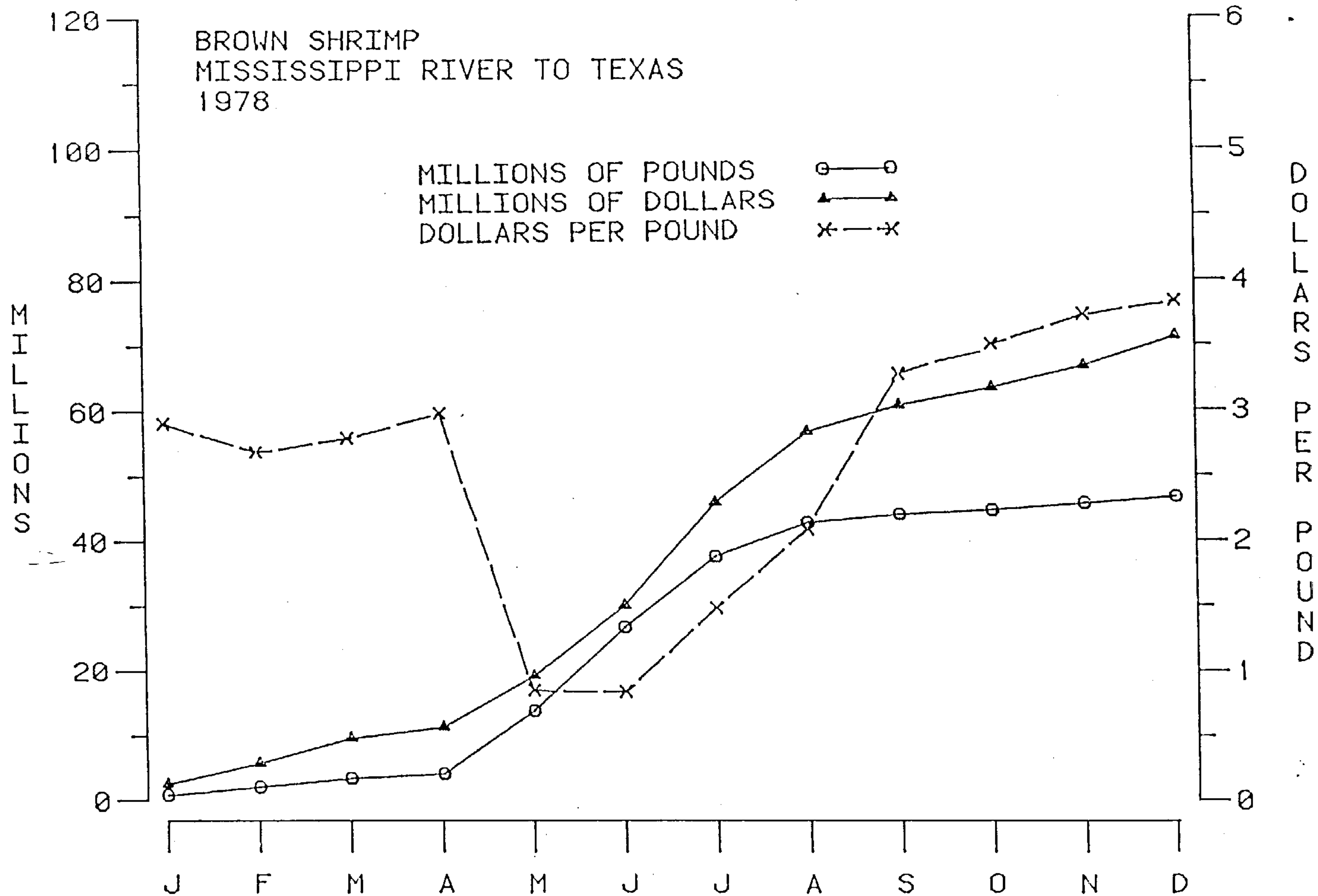




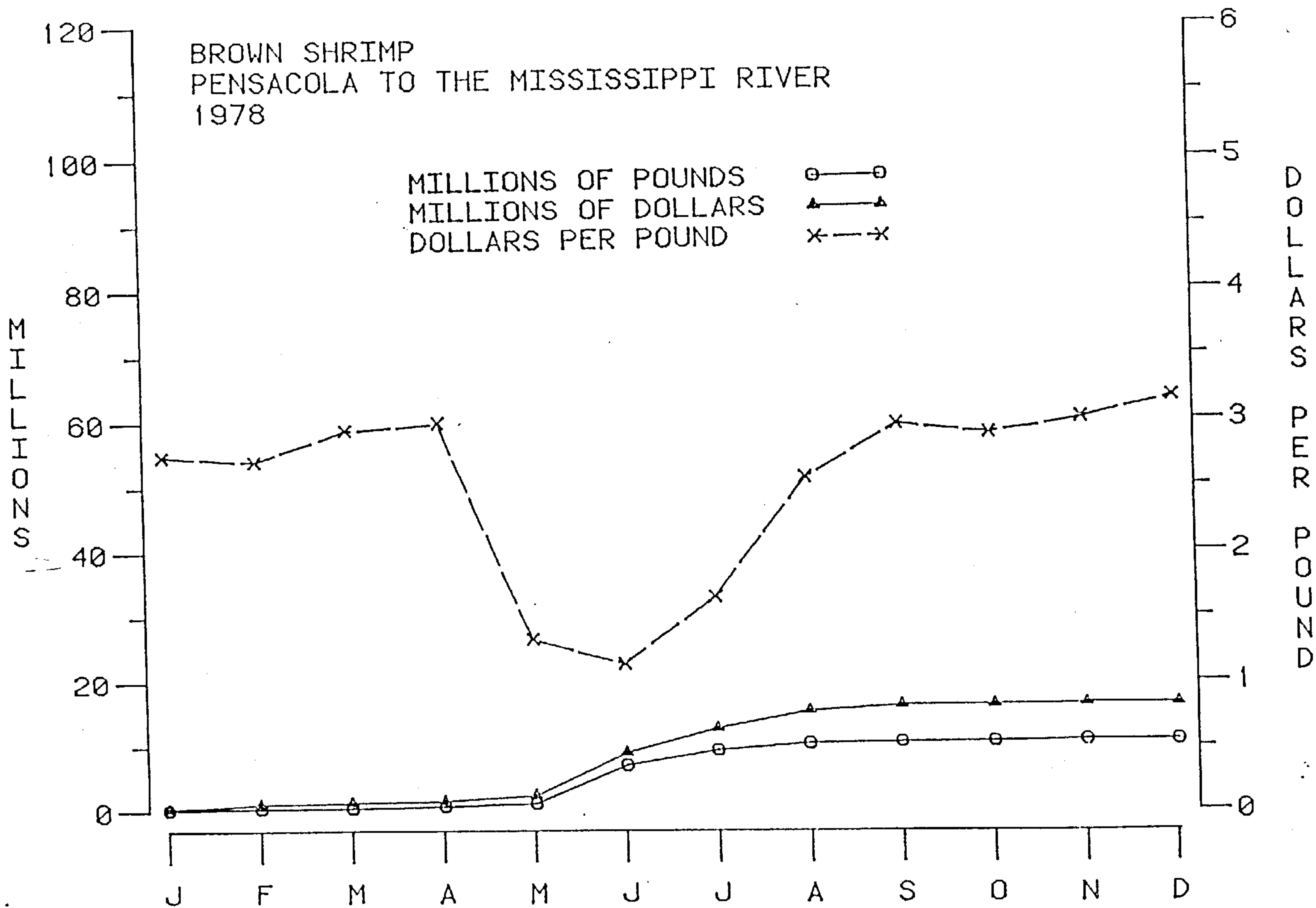


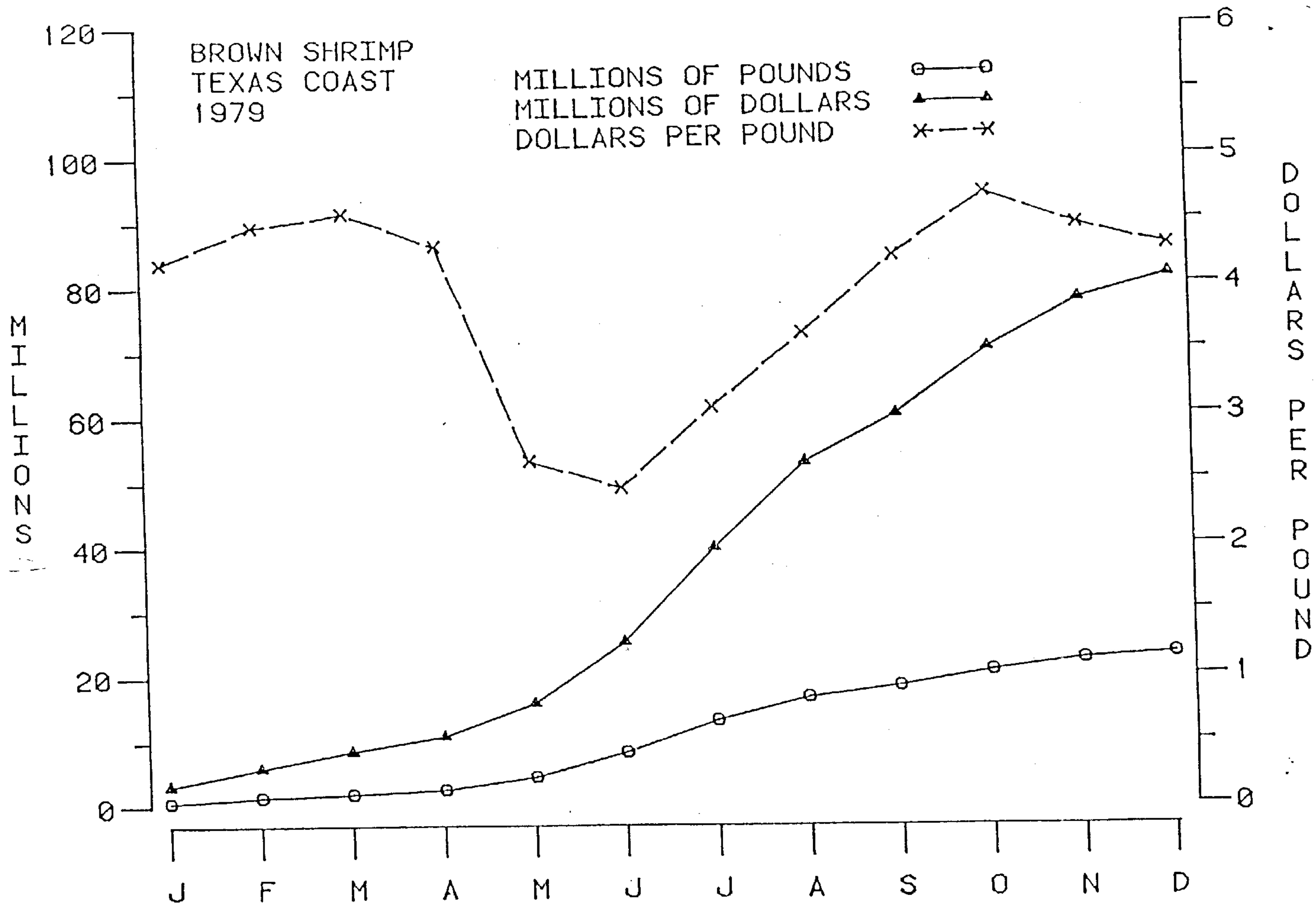


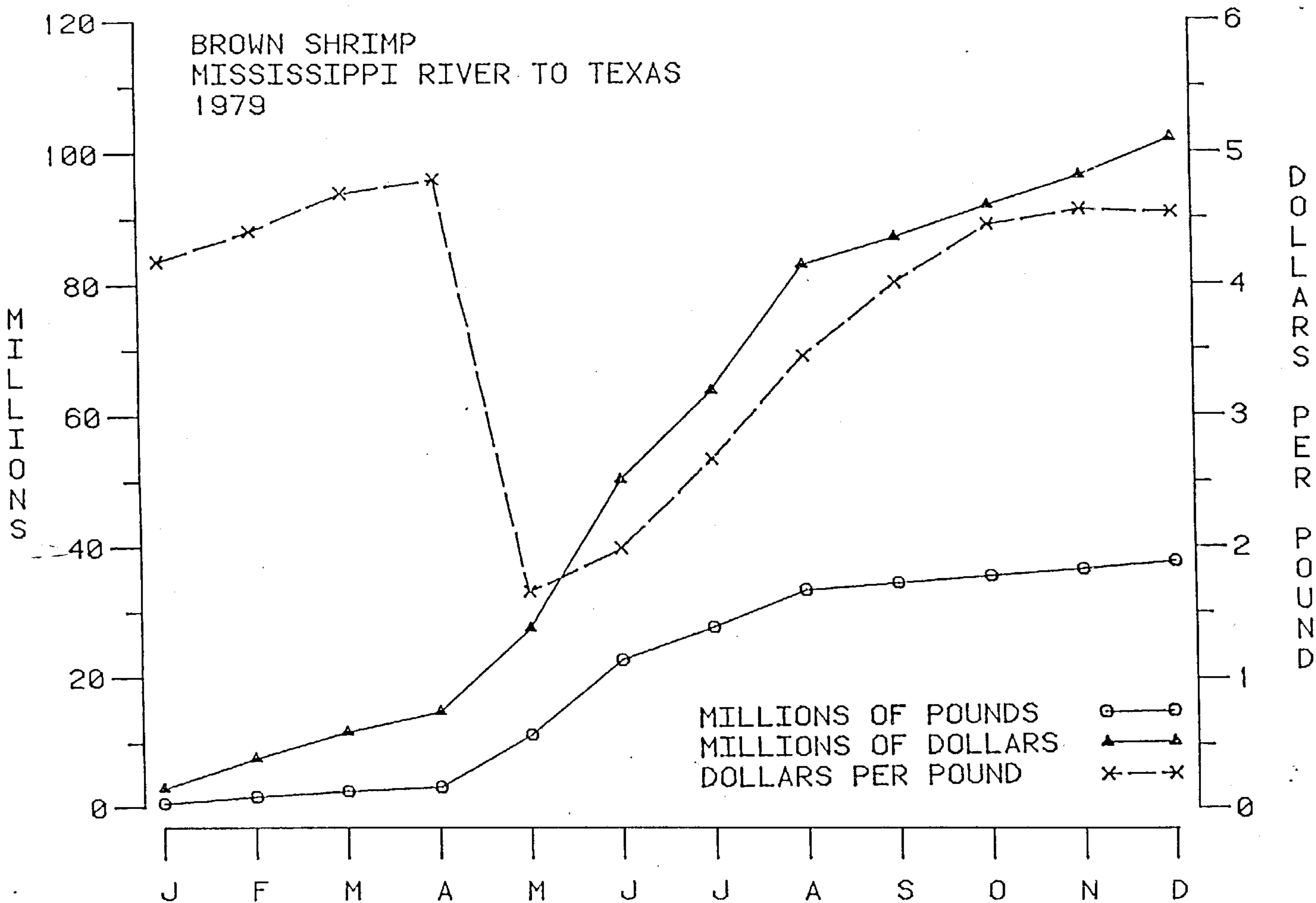
BROWN SHRIMP  
MISSISSIPPI RIVER TO TEXAS  
1978



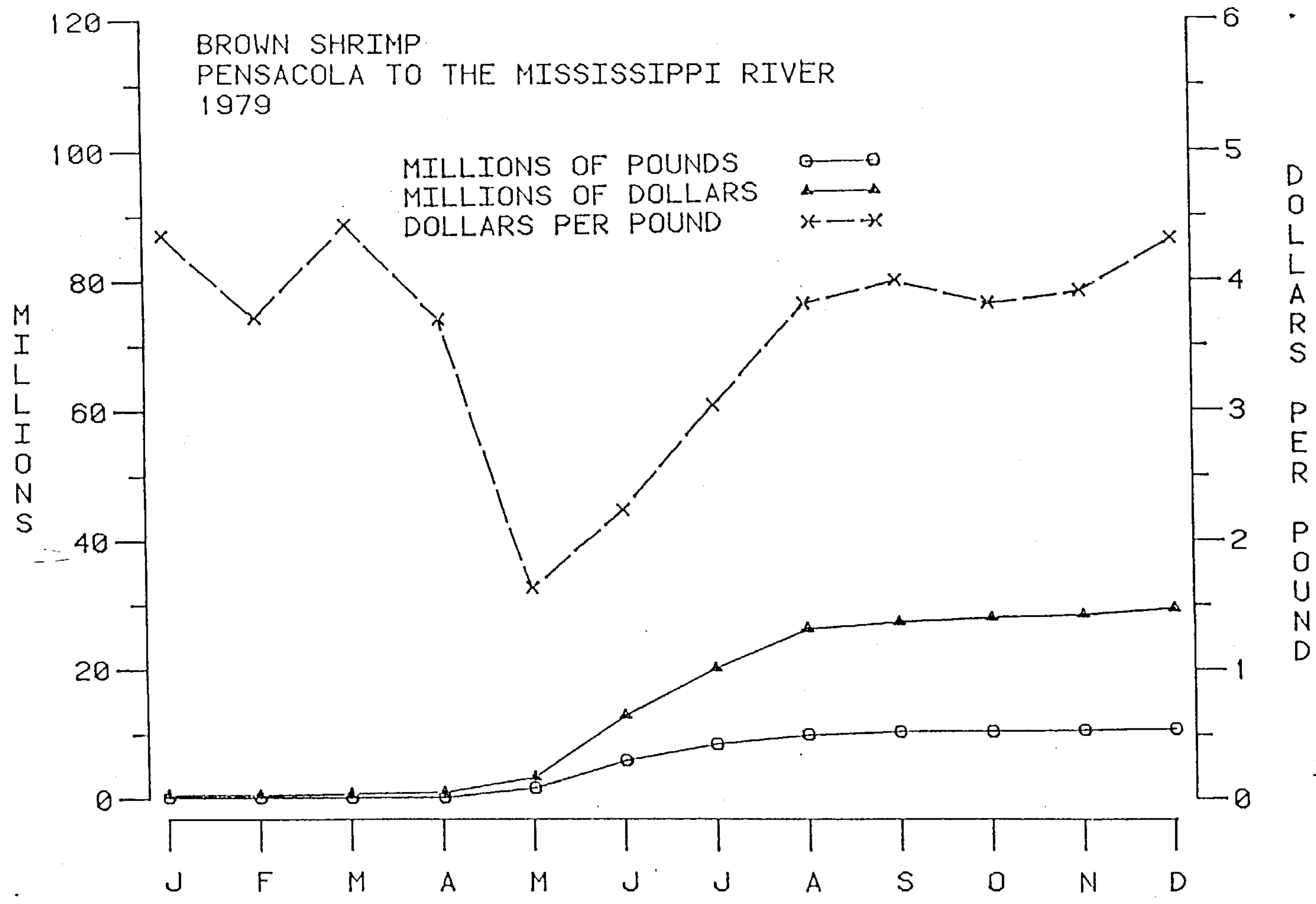
# BROWN SHRIMP PENSACOLA TO THE MISSISSIPPI RIVER 1978

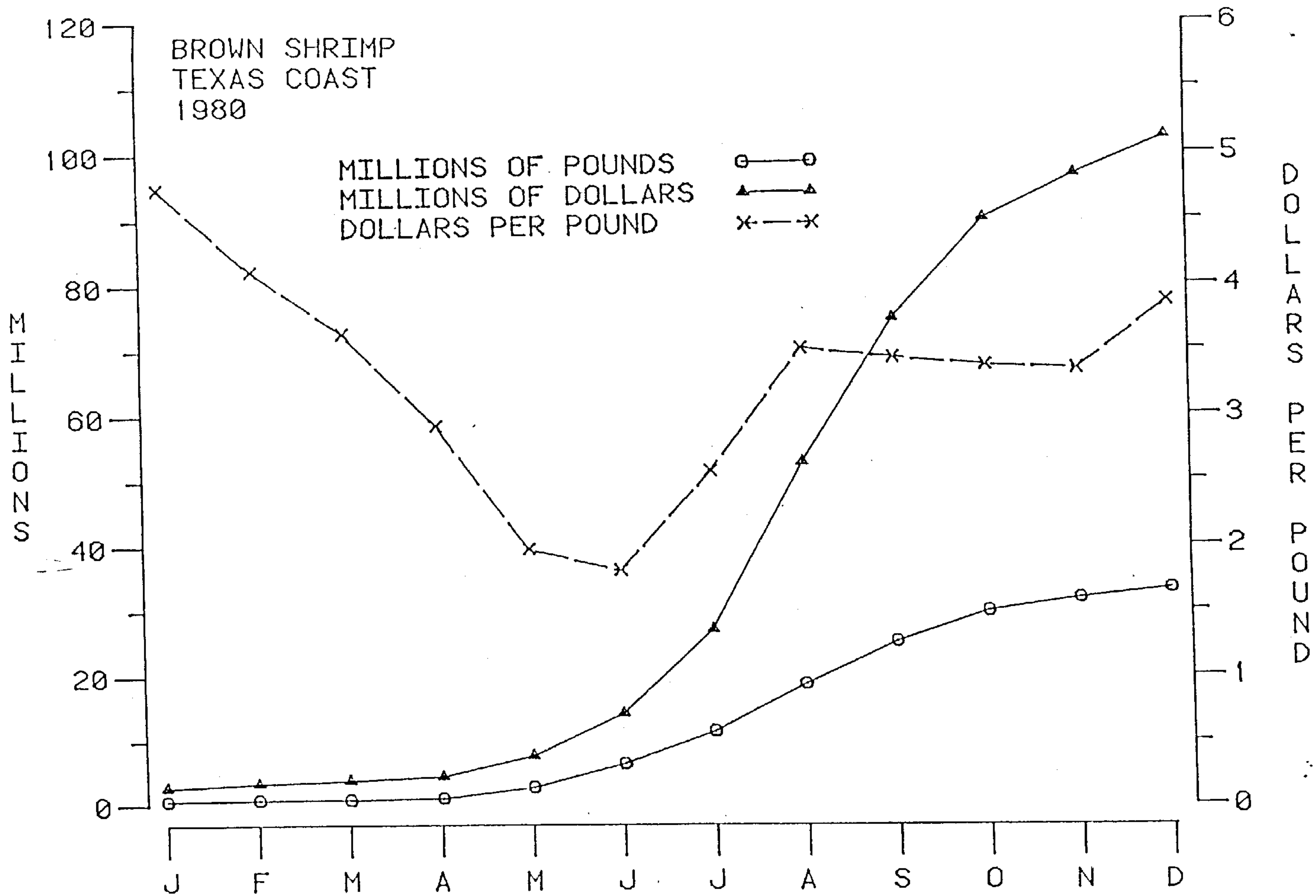




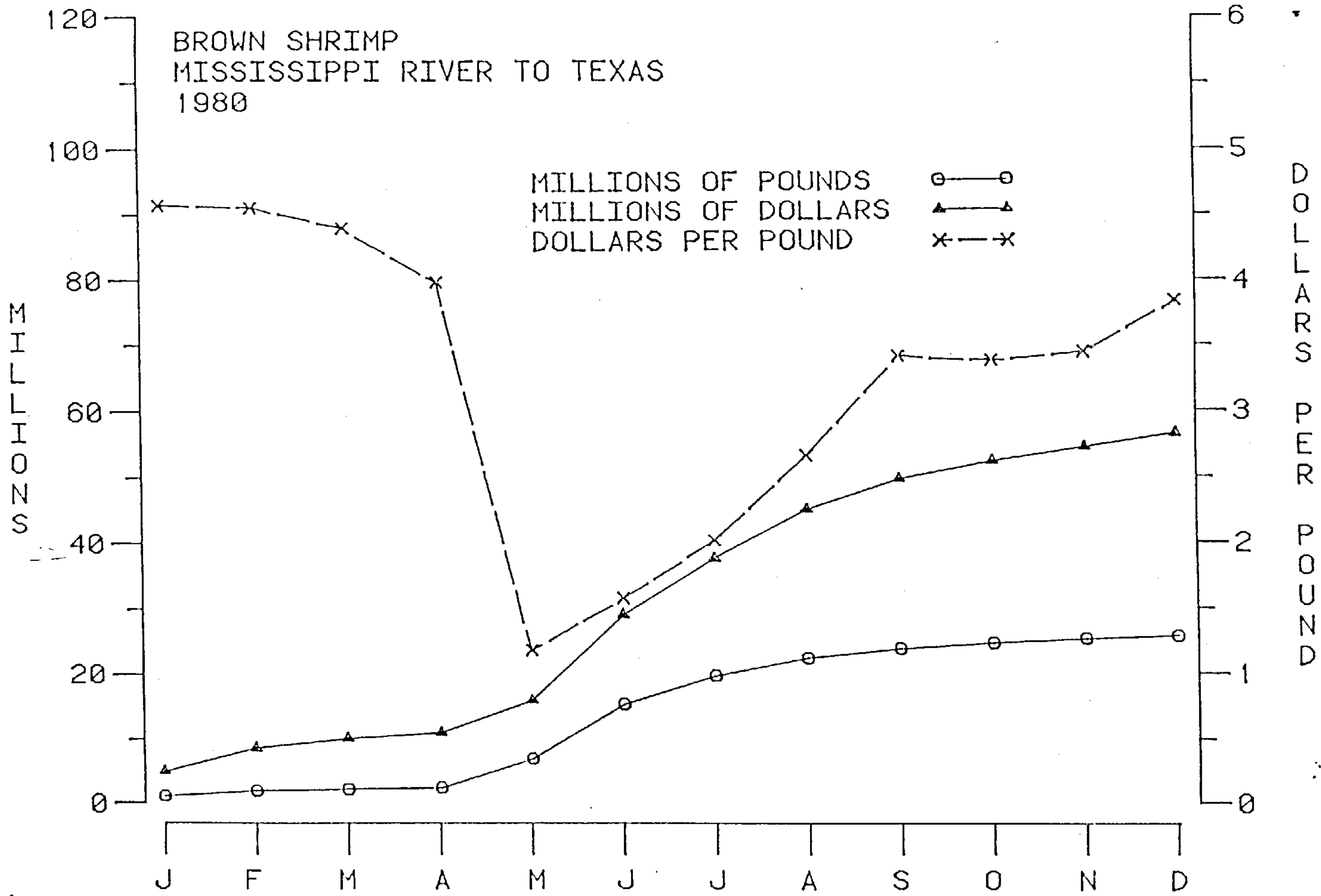








BROWN SHRIMP  
MISSISSIPPI RIVER TO TEXAS  
1980



BROWN SHRIMP  
PENSACOLA TO THE MISSISSIPPI RIVER  
1980

